

A REVISION OF THE GENUS
DIPLOTAXIS (COLEOPTERA,
SCARABAEIDAE,
MELOLONTHINAE)

PART 2

PATRICIA VAURIE

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INTRODUCTION

THE PRESENT PAPER is the second and final part of a revision of the 220 species of the New World genus *Diplotaxis* (Canada south to Panama), of which 66 species were treated in part 1 (Vaurie, 1958). The present part includes 154 valid species (48 of which are described as new), arranged in 13 groups, and 12 single species, two *incertae sedis*, and two fossil species; 51 names are considered synonyms of existing species. A total of more than 50,000 specimens representing the 220 species have been examined.

A comparison of the genus with related genera, and discussions of the general morphology and phylogeny of the species, are given in the first part of this revision, along with descriptions of the genitalia. The reader is also referred to the first part of the revision for the treatment and methods used, which are followed in the present part, with a few exceptions. Thus the groups are not all handled in exactly the same manner. A few general group characters are given for all groups, but in four (*trapezifera*, *misella*, *truncatula*, and *connata*) a formal description of the characters common to the species of the group is given. In the largest group (*trapezifera*, with 49 species) the range is placed before the diagnosis because the latter is combined with the description (see treatment under *trapezifera* group).

The key covers all the described species of the genus and supersedes the partial key given in part 1. Some of the larger groups are keyed out as a unit, and the key to these species appears with the group itself. An asterisk before the species or group name in the key indicates that it appears in the first part of the revision.

The types of five of Schaeffer's and one of Casey's species discussed previously by me (1958) have now been examined, but one of Schaeffer's, one of Fall's, and one of Burmeister's types have not been found where their other types were deposited. I have examined the types or lectotypes of all the described forms, valid or not, with the exceptions just mentioned and with the exception of 17 others, as follows: eight of Blanchard's types (not found in the Paris Museum on a visit in 1957); three of Say's (destroyed); two of

Cazier's (in California and Texas institutions); two of Walker's (in the British Museum under the generic name of *Ancylonycha*); one of Germar's (possibly in some European museum); one of Robinson's (said to be in the collection of the author), and one of Saylor's (in California).

In the volumes of the "Biologia Centrali-Americana" there is often a question as to whether a given locality is a state or a settlement of the same name, because there are many duplications throughout Mexico. In this present revision, the name refers always to the state unless further qualified.

The following 48 new species of *Diplotaxis* are described in the body of this paper, but are listed below because their names are used in the keys that precede the descriptions. They are from Mexico unless otherwise stated.

academia, Miraflores, Baja California
amecameca, Amecameca, Mexico
assimilis, Morelia, Michoacan
australis, Comondu, Baja California
bifida, Acatlan, Puebla
brachyptera, Samalayuca, Chihuahua
circulans, Jacala, Hidalgo
commixta, Acapulco, Guerrero
concava, El Mogote, Guerrero
corbula, Holtville, California, United States
crucis, Las Cruces, Chiapas
dissona, Matachic, Chihuahua
durango, Durango, Durango
elongata, J. Manuel, El Salto, Durango
exstans, Catarinas, Chihuahua
femoralis, Colima, Colima
flexa, San Bartolo, Baja California
hirtipes, El Mogote, Guerrero
igualta, Guerrero state
incisa, Mexcala, Guerrero
kuschei, Venodio [Venadillo], Sinaloa
latispina, Progreso, Morelos
macrotarsus, Variedades, Suchitpequez, Guatemala
marina, Santa Maria del Mar, Oaxaca
mascula, Miraflores, Baja California
mediafusca, Morelia, Michoacan
megapleura, Tepic, Nayarit
mexcala, Mexcala, Guerrero
microchele, Cuernavaca, Morelos
missionaria, San Ignacio, Baja California
mistura, San Salvador, El Salvador
pala, Tepic, Nayarit

parpolita, Todos Santos, Baja California
pygidialis, El Tascate, Durango
roberti, El Mogote, Guerrero
rotunda, Madera Canyon, Santa Rita Mountains,
 Arizona, United States
saltensis, J. Manuel, El Salto, Durango
sinuans, El Mogote, Guerrero
sonora, Hermosillo, Sonora
sparsa, Acapulco, Guerrero
superflua, Palos Colorados, Durango
tehuana, Salina Cruz, Oaxaca
tumida, Morelia, Michoacan
turgidula, Jacala, Hidalgo
tzitzio, Tzitzio, Michoacan
urbana, Urbana, Illinois, United States
veracruzana, Zapuapan de Cabanas, Veracruz
yucateca, Chichen Itza, Yucatan

ACKNOWLEDGMENTS

As mentioned previously (Vaurie, 1958), this revision was made possible by Grants 2129 and 3885 from the National Science Foundation, for which the author is grateful.

Since publication of the first part of the revision, I have had the assistance of or courtesies from a number of individuals to whom I wish to express my thanks: Dr. C. Clayton Hoff, University of New Mexico, for a gift of specimens from New Mexico, many with biological notes; Dr. M. W. Sanderson of the University of Illinois for a gift of specimens from Oaxaca and Puebla; Mrs. Leonora K. Gloyd of the same institution for localities of numbered specimens; Dr. H. J. Grant, Jr., Academy of Natural Sciences of Philadelphia, for help in locating the whereabouts of the types of *residua* Fall and *punctulata* Horn, and to him and Dr. J. A. Rehn for making available the type of *errans* Fall; Mr. H. B. Leech, California Academy of Sciences, for the opportunity to pick a lectotype of *punctulata* Horn from the syntypes; Dr. F. Werner, University of Arizona, for the loan of the paratype of *microps* Cazier; Dr. K. S. Hagen, University of California Agriculture Experiment Station, Albany, for sending the paratype of *dahli* Cazier; Dr. E. B. Britton, British Museum (Natural History), for comparison of the type of *nigriventris* Bates; and Dr. A. Villiers of the Muséum National d'Histoire Naturelle, Paris, for his examination of the type of *ebenina* Blanchard.

Additional material has also been sent to me by individuals and institutions not men-

tioned previously (Vaurie, 1958): Agricultural and Mechanical College of Texas, Dr. H. J. Reinhard; Department of Agriculture, Ottawa, Dr. H. Howden; University of Idaho, Dr. W. F. Barr; Instituto Tecnológico de Estudios Superiores de Monterrey, Mr. J. Mathieu; University of Kansas, Snow Museum, Dr. G. W. Byers; Ohio State Museum, Dr. E. S. Thomas; Ohio State University, Dr. J. N. Knull; also Dr. B. Benesh, Tennessee, and Mr. L. J. Bottimer, Texas.

Again I wish to thank my husband, Dr. Charles Vaurie, for his aid with many of the drawings and maps, and Mrs. Rose Ismay of the American Museum of Natural History for typing most of the manuscript.

HABITAT

Habitat information on these chiefly nocturnal beetles is recorded in the present paper for only one-fourth of the 154 species discussed. Some of these species were found on the same kinds of vegetation as the species treated in part 1 (Vaurie, 1958, p. 271), but many occur in situations and on plants not mentioned previously. The most interesting data refer to two species, *obscura* in Oregon and *macrotarsus* in El Salvador, and concern their being found associated with the nests of ants. An adult of the latter species was taken in the debris of a nest, but *obscura* larvae and pupae as well were found in a large nest, the larvae in the soil away from the nest where they may have been feeding on roots. (See under each of the two species for further details.) William F. Barr (personal communication, 1960) has found larvae of an unidentified species deep down in nests of the harvester ant (*Pogonomyrmex occidentalis* Cresson) in southern Idaho. Owen Bryant (personal communication, 1955) also found "some large *Diploptaxis* . . . near Edmonton [Alberta], in the soft dirt on the sides of a large ant-nest . . . I wondered whether they were there . . . because the soft dirt was easy to dig into." Mr. Bryant had taken these beetles under partly buried stones where, he thought, they may frequently pupate. Other collectors have taken various species by day from leaf litter or debris or soil under various trees (mimosa, poplar, acacia, avocado, oak, button-bush, hickory, walnut, pine, juniper, persimmon, peach, apricot, and apple) or

feeding on these trees at night. According to Ritcher (1958, p. 325), "Among the Melolonthinae, many species of *Serica*, *Diplotaxis*, and *Phyllophaga* mate at night while the female continues feeding on foliage." Nine of the large species of the *brevicollis* group have been collected at night on juniper, and eight or nine of the small species of other groups on oak. The adults of three species (*tenebrosa* in the northwestern United States, *pinalica* in Arizona, and *punctata* in Texas) are reported as actually injuring young fruit trees by their feeding. Some species have been taken on grape, and one species was captured on the flowers of cotton; some are found on weeds, grasses, or flowers. According to notations on the labels of adult specimens, *Diplotaxis* occur on trees, shrubs, weeds, or vines of the following genera (in addition to those given in part 1): *Artemisia*, *Casearia*, *Cephalanthus*, *Cordia*, *Croton*, *Eysenhardtia*, *Lantana*, *Luffa*, *Mesembryanthemum*, *Muscadina*, *Ostrya*, *Pinus*, *Piper*, *Populus*, *Quercus*, *Sesamum*, and *Vitis*.

In the first part of July, 1955, my husband and I collected, on various nights, about 700 *Diplotaxis* of eight or nine species on a hillside above the city of Oaxaca, Mexico, but when we returned to the same spot on August 3, 1959, an evening's search with head lamps resulted in the collection of but one specimen of *Diplotaxis barbarae*. The trees on which we collected in 1955 were young pepper trees (*Schinus molle*) of the family Anacardiaceae (sumac) and young feathery trees of the Mimosaceae family (*Enterolobium cyclocarpum*). In four years these trees had grown larger, and of course the season was farther advanced on the return trip (in 1955 many of the beetles were mating); either fact may have accounted for the absence of the beetles. It may be pertinent also that in 1955 there were as many *Phyllophaga* on these trees as *Diplotaxis*, but in 1959 there were none.

NEW RECORDS

Additional information on species already discussed in part 1 is now available, as follows:

Diplotaxis cribulosa LeConte: According to Essig (1958, p. 441), the adults of *popino* Casey [= *cribulosa*] "at times defoliate apple, peach, rose, black walnuts, and pear. The

green fruit is devoured. It has also been taken on monkey flower."

Diplotaxis jamaicensis Cazier: Adults of this species were found by Milton W. Sanderson (personal communication) in Jamaica in 1958 feeding on the following tropical shrubs or trees, which were identified for him by Dr. Richard Proctor and Miss Dulcie Powell of the Institute of Jamaica, Kingston: *Piper amalago* v. *nigrinodum*, *Lantana camara*, *Cordia jamaicensis*, and *Casearia sylvestris*.

Diplotaxis knausii Schaeffer: Six specimens of this species have been seen from Sabino Canyon, Arizona, taken "on wild flowers" on August 8, 1915, by J. F. Tucker, and one specimen "nr. roots mesquite" on July 27, 1915.

Diplotaxis puberula LeConte: L. J. Bottimer informs me (personal communication) that specimens of this hairy species "were taken feeding on . . . two oaks (not officially determined as to species)." He adds an interesting comment: ". . . the injury differs from that of *Phyllophaga* in that the *Diplotaxis* will eat only enough of the outer margin to permit it to get to the interior. *Phyllophaga* does not seem to object to the outer margins."

DISTRIBUTION

Aside from three islands in the West Indies (Guadeloupe, Jamaica, and possibly Martinique) and two in the Gulf of California (Tiburón and María Madre), the genus *Diplotaxis* is confined to the mainland of North America, from Canada to Panama. Of the 220 species, two are found in the West Indies (one of these endemic)¹; of the 218 remaining species, one is endemic to Panama and three are to Guatemala, leaving a total of 214 for the rest of Central America, Mexico, the United States, and Canada. By far the greatest proportion (94) of these 214 are restricted to Mexico, with the United States a poor second with only 41 endemic species. Fifty-six additional species are, however, shared by the two countries. Thus Mexico has a total of 168 (see table 1), and the United States, 97. No species are endemic to Canada, as all the seven spe-

¹ A third alleged *Diplotaxis* has been described by Blanchard, 1850, from Martinique in the West Indies, which I have not been able to examine or recognize; if this is indeed a *Diplotaxis*, then the number of valid species should be raised to 221.

cies that occur there are found also in the United States, two of these reaching Mexico also. Only five species are endemic to Central America, but 18 species are common to both Central America and Mexico. With the 94 Mexican species mentioned above, there are therefore 117 species restricted to the region south of the United States, as compared with the 46 found only north of Mexico.

The United States-Mexico border, of course, is not a natural boundary, and it is not surprising to find that the majority of the 56 species common to both the United States and Mexico are found, in Mexico, only in the northern states. Ten of these 56 extend farther south, however, and are found either in many states (such as *aenea*, *angularis*, *denticeps*, *tarsalis*, and *trapezifera*), or in only one or two states. Sixty-one additional species from northern Mexico are not known from the United States, and 50 of the 168 found in Mexico do not range to northern Mexico. Thus, generally speaking, some species are restricted to the northern states of Mexico and others to the southern states, with only a slight degree of overlap between the northern and southern groups. For the purpose of this paper, northern Mexico is defined as the states of Guanajuato, Jalisco, and San Luis Potosi and northward.

In the United States the majority of species occur in the southwestern states of Texas, Arizona, and New Mexico, each of which has at least 35 species. Some are found in all three states, but Arizona and Texas are more distinct, as Arizona has about 20 species not recorded from New Mexico or Texas, and Texas has 20 or 21 not recorded from either of the other states. California ranks next, with about 19 species, five of which are not found in Arizona, New Mexico, or Texas. Nevada, Colorado, and Utah have a dozen or so species, but these represent only extensions of range from the south. Northward and eastward the species become fewer. In Kansas and Oklahoma all but one or two of the western species drop out and are replaced by about a dozen species from Texas or the eastern United States. East of the Mississippi River there are in all only 17 species,¹ nine of which

have not crossed the river to the west. Those that have crossed occur no farther west than the central states of Nebraska, Kansas, Oklahoma, and Texas. In the reverse direction, but north of Texas, only one western species (*obscura*) is known from east of the Mississippi (fig. 104). Among the eight species that range westward across the Mississippi, several reach the Mexican border, but only one (*puberula*) has been collected in Mexico, in the northeastern part, as might be expected.

Among the larger morphological groups of species (at least five species), in which the majority of the species are common to both the United States and northern Mexico, we may mention the *frondicola* group (25) in which all but one species occurs in the United States; the *brevicollis-haydenii* group (26), of which four species are not in the United States and eight are not in Mexico; the *misella*, *truncatula*, and *marginicollis* groups (six species each); and the *moerens* group (five). The large *trapezifera* group (49) is, on the other hand, predominantly southern in the distribution of its species, although seven species are found in the northern area of Mexico and two penetrate as far as the United States. Also southern are the *puberula-pilipennis* group (13), with the exception of *puberula* itself; the *puberea* group (10), of which two species penetrate into the United States; the *atramentaria* group (eight); and the *simplex* group (eight). Distribution is discussed briefly under each species group in the text.

Only a dozen of the 45 dorsally pubescent species of the genus are found in the United States, there being only one (*sordida*) throughout the eastern states, one (*vandykei*) in Alabama, two (*brevisetosa*, *rex*) in southeastern Texas, one (*dahli*) restricted to California, one (*rudis*) in the central and western states, and six others (*arizonica*, *cribulosa*, *mimosae*, *muricata*, *mus*, and *puberula*) in northern Mexico as well as in Texas and/or the southwestern United States. The character of hairiness seems thus to be correlated more with southern distribution. In Guatemala, of 18 species, nine (*alutacea*, *aurata*, *brevipilosa*, *cavifrons*, *crinigera*, *guatemalica*, *hirsuta*, *poropyge*, and *puncticollis*) are hairy. There are no hairy species recorded from Baja California. The *puberula*, *pilipennis*, *puberea*, and *simplex* groups account for 32 of the hairy

¹ Four species have been added to the 13 listed for the east by Vaurie (1956); these are *urbana*, *vandykei*, *lengii*, and *puberula*.

species. (Other hairy species are *bowditchi*, *clypeata*, *corbula*, *coriacea*, *costanera*, *fissilabris*, *halleyi*, *indigena*, *jacala*, *jamaicensis*, *knausii*, *microtichia*, *obregon*, *pilifera*, *pilipennis*, *puberea*, *rockefelleri*, *rugosifrons*, *selanderi*, *simillima*, *spina*, *subrugata*, *tarascana*, and *zapoteca*.)

There is apparently a division also between north and south in respect to the size of the species, as a greater proportion of large species inhabit the northern areas. There are only a dozen large species (about 12 mm.) in southern areas, including nine of the *puberea* group, *aereomicans* of the *simplex* group, *microchele* from southern Mexico, and *punctulata* (as large as 17 mm.) from southern Baja California (both the latter in the *punctulata* group), whereas in the United States or extreme northern Mexico many species, including at least 20 of the *brevicollis-haydenii* group, are large, some of them as long as 14 and 17 mm.

Thus we have more large glabrous species in the north and more small hairy ones in the south. If we take some of the other "either-or" characters, we find that all the species with nine-segmented instead of 10-segmented antennae occur in the north. Six of these are in the *hebes* group (*abnormis*, *carinata*, *contracta*, *cribratella*, *hebes*, and *mima*); one is the virtually wingless *saylori* from Arizona; one is *rudis* from the central and western states (a pubescent species with simple claws); and one is *languida* (restricted to Georgia and Florida).

The 12 species with the inner wings either reduced or virtually lacking (not necessarily in all specimens of the population) are also restricted to northern Mexico or the United States. These species are in six different groups, but four each are in two groups (*connata* and *frondicola* groups). They are *brachyptera*, *brevisetosa*, *connata*, *corvina*, *fimbriata*, *macronycha*, *muricata*, *obscura*, *residua*, *rotunda*, *rudis*, and *saylori*.

Of 14 species with the labrum appearing bilobed because of a longitudinal cleft at center, all are northern except for *bifida* from southern Mexico (*anxius*, *aulacochela*, *bifida*, *brachyptera*, *conformis*, *cribulosa*, *fissilabris*, *knausii*, *mimosae*, *moerens*, *mus*, *obregon*, *rex*, and *rudis*).

The 21 species with the sides of the abdo-

men ridged, however, are about equally divided between north and south, although in the United States proper (omitting northern Mexico) there are only eight, most of which are in the *truncatula* group. These species, in six or seven different groups, are: *aereomicans*, *arctifrons*, *arizonica*, *atrutula*, *bowditchi*, *cavifrons*, *contracta*, *cribulosa*, *crinigera*, *guatemalica*, *jamaicensis*, *levicosta*, *mima*, *mimosae*, *obregon*, *poropyge*, *puberea*, *pumila*, *punctata*, *rugosifrons*, and *truncatula*.

Species with noticeable secondary sexual characters in the males seem to be more numerous in the north, but such a preponderance probably has little significance, as it depends upon how these characters are counted, and one species may have more than one such character. (For these characters, see Vaurie, 1958, pp. 278-279; and below, under Sexual Dimorphism.)

In order to give an idea of the distribution within Mexico, a table is presented below (table 1) in which are listed all the species (168) occurring in Mexico, with a special column for those occurring also in the United States, and the total number of species in each Mexican state. (The states are arranged from north to south, i. e., from left to right.) It can be seen in the table that the greater concentration of species is in the northwestern states (Chihuahua, Durango, and Sonora) and in the extreme southern states (Guerrero, Oaxaca, and Chiapas). It is evident that some states are poorly represented, possibly because the states are small, as are Aguascalientes, Colima, Distrito Federal, Morelos, Queretaro, and Tlaxcala, or because they have not been adequately collected. One of the small states (Morelos), however, has more species recorded than the larger states of Sinaloa in the northwest or than Tamaulipas in the northeast. The species of Yucatan probably are found also in the other states of the peninsula (Campeche and Quintana Roo), but the latter states, although large, are seldom visited by collectors. Likewise, it seems reasonable to assume that species found on the Atlantic slopes of Chiapas might be found as well in the state of Tabasco, but we have no specimens from there. Quite a few states of Mexico apparently have restricted species, but most of these, with further collecting, will no doubt be found in other states as well.

TABLE 1
Diplotaxis SPECIES IN MEXICO AND THE UNITED STATES (SPECIES RESTRICTED TO THE UNITED STATES NOT INCLUDED)

	United States	Baja California	Sonora	Chihuahua	Coahuila	Nuevo Leon	Tamaulipas	Sinaloa	Durango	Zacatecas	San Luis Potosi	Nayarit	Jalisco	Aguascalientes	Guanajuato	Queretaro	Hidalgo	Veracruz	Colima	Michoacan	Mexico	Distrito Federal	Tlaxcala	Puebla	Morelos	Guerrero	Oaxaca	Tabasco	Chiapas	Campeche	Yucatan	Quintana Roo
<i>abnormis</i>	x																															
<i>academia</i>	x	x																														
<i>aenea</i>	x	x							x	x																						
<i>aeromicans</i>	x																															
<i>ambigua</i>	x		x																													
<i>amecameca</i>	x																															
<i>angularis</i>	x																															
<i>angustula</i>																																
<i>anthracina</i>																																
<i>arctifrons</i>																																
<i>arizonica</i>	x																															
<i>assimilis</i>																																
<i>atramentaria</i>																																
<i>atrata</i>	x																															
<i>aulacochela</i>	x																															
<i>australis</i>																																
<i>bakeri</i>																																
<i>barbarae</i>																																
<i>beltragei</i>	x																															
<i>beyeri</i>	x																															
<i>bicolor</i>	x																															
<i>bifida</i>																																
<i>boops</i>	x																															
<i>bradichi</i>																																
<i>brachypiera</i>	x																															
<i>brenicollis</i>	x																															
<i>brenicornis</i>	x																															
<i>brenidens</i>	x																															
<i>carbonata</i>	x																															
<i>carinata</i>																																
<i>carinifrons</i>																																
<i>calarinas</i>																																
<i>cavifrons</i>																																
<i>chiricahuae</i>	x																															
<i>circulans</i>																																
<i>clypeata</i>																																
<i>commixta</i>																																
<i>completa</i>	x																															
<i>concolor</i>																																
<i>confusa</i>																																

TABLE 1—(Continued)

	United States	Baja California	Sonora	Chihuahua	Coahuila	Nuevo Leon	Tamaulipas	Sinaloa	Durango	Zacatecas	San Luis Potosi	Nayarit	Jalisco	Aguaascalientes	Guanajuato	Queretaro	Hidalgo	Veracruz	Colima	Michoacan	Mexico	Distrito Federal	Tlaxcala	Puebla	Morelos	Guerrero	Oaxaca	Tabasco	Chiapas	Campeche	Yucatan	Quintana Roo
<i>consentanea</i>																																
<i>contracia</i>																																
<i>convexilabrum</i>																																
<i>corbula</i>																																
<i>coriacea</i>																																
<i>corroea</i>																																
<i>corrina</i>																																
<i>costanera</i>																																
<i>cribratella</i>																																
<i>cribraticollis</i>																																
<i>cribriceps</i>																																
<i>cribulosa</i>																																
<i>crinigera</i>																																
<i>crucis</i>																																
<i>curvaceps</i>																																
<i>decima</i>																																
<i>denigrata</i>																																
<i>dentella</i>																																
<i>denticeps</i>																																
<i>dissona</i>																																
<i>durango</i>																																
<i>elongata</i>																																
<i>exstans</i>																																
<i>femoralis</i>																																
<i>fimbriata</i>																																
<i>fossilabris</i>																																
<i>fossilis</i>																																
<i>flexa</i>																																
<i>fossifrons</i>																																
<i>fossilpalpa</i>																																
<i>foveicollis</i> ^a																																
<i>glabrimargo</i>																																
<i>halleyi</i>																																
<i>haydenii</i>																																
<i>hebes</i>																																
<i>hirsuta</i>																																
<i>hirtipes</i>																																
<i>iguata</i>																																
<i>ilustris</i>																																
<i>impar</i>																																
<i>incisa</i>																																
<i>indigena</i>																																

TABLE 1—(Continued)

[illegible]

TABLE 1—(Continued)

	United States	Baja California	Sonora	Chihuahua	Coahuila	Nuevo Leon	Tamaulipas	Sinaloa	Durango	Zacatecas	San Luis Potosi	Nayarit	Jalisco	Aguaascalientes	Guanajuato	Queretaro	Hidalgo	Veracruz	Colima	Michoacan	Mexico	Districto Federal	Tlaxcala	Puebla	Morelos	Guerrero	Oaxaca	Tabasco	Chiapas	Campeche	Yucatan	Quintana Roo
<i>puberea</i>	x																	x?								x						
<i>puberula</i>	x					x	x														x					x						
<i>pubipes</i>	x					x	x											x														
<i>punctata</i>	x					x	x																									
<i>puncticeps</i>	x					x	x																									
<i>puncticollis</i>	x					x	x																									
<i>punctulata</i>		x																														
<i>pygmaealis</i>																																
<i>rita</i>																																
<i>roberti</i>																																
<i>rockefelleri</i>																																
<i>rosae</i>																																
<i>rufola</i>																																
<i>rufipes</i>	x																															
<i>rugosifrons</i>																																
<i>saltensis</i>																																
<i>selanderi</i>																																
<i>similima</i>																																
<i>simplex</i>																																
<i>sinuans</i>																																
<i>sonora</i>																																
<i>sparsa</i>																																
<i>spina</i>																																
<i>statura</i>	x																															
<i>subangulata</i>	x																															
<i>subrugata</i>	x																															
<i>sulcatula</i>	x																															
<i>superflua</i>																																
<i>tarsasana</i>																																
<i>tarsalis</i>	x																															
<i>tehuana</i>																																
<i>tepicana</i>																																
<i>thoracica</i>	x																															
<i>trapezifera</i>																																
<i>truncatula</i>	x																															
<i>tumida</i>																																
<i>turgidula</i>																																
<i>tzitzio</i>																																
<i>veracruzana</i>																																
<i>yucateca</i>																																
<i>zapoteca</i>																																
Total number of species ^a	56	15	26	46	11	13	10	9	44	9	13	13	19	5	6	1	18	17	11	22	13	6	1	15	13	26	32	0	21	1	7	4

^a Known only from "Mexico."^b Doubtful records (marked x?) are not included in the total.

These states and the number of endemic species are: Baja California, nine; Oaxaca, seven; Guerrero and Durango, five each; Sinaloa and Nayarit, two each; and one each for Sonora, Chihuahua, Jalisco, Michoacan, Mexico, Morelos, Hidalgo, Puebla, Veracruz, and Chiapas. Some of these restricted species are known from only a few specimens or from a single series, but others (as *zapoteca* from Oaxaca) are abundant.

Following is a breakdown of the species, endemic or otherwise, in the various regions under discussion.

Species endemic to the West Indies: *Diplotaxis jamaicensis*, *ebenina* (?).

Species endemic to the United States: *Diplotaxis aequalis*, *anxius*, *atlantis*, *basalis*, *bidentata*, *blanchardi*, *brevisetosa*, *conformis*, *conata*, *dahli*, *deserta*, *dubia*, *errans*, *frondicola*, *fulva*, *harperi*, *incuria*, *insignis*, *languida*, *lengii*, *macronycha*, *parallela*, *pinalica*, *pumila*, *punctatorugosa*, *punctipennis*, *residua*, *rex*, *rotunda*, *rudis*, *rufa*, *saylori*, *schaefferi*, *semifoveata*, *sierrae*, *subcostata*, *texana*, *trementina*, *ungulata*, *urbana*, *vandykei*.

Species occurring in both Canada and the United States: *Diplotaxis brevicollis*, *liberta*, *obscura*, *sordida*, *subangulata*, *tenebrosa*, *tristis*.

Species occurring in Central America, by countries (all occur also in Mexico except for *alutacea*, *aurata*, *brevipilosa*, *guatemalica*, and *zeteki*): Guatemala: *Diplotaxis alutacea*, *angustula*, *aurata*, *bicolor*, *brevipilosa*, *carinifrons*, *cavifrons*, *crinigera*, *guatemalica*, *hirsuta*, *macrotarsus*, *maya*, *ohausi*, *poropyge*, *puncticollis*, *rita*, *simplex*, *trapezifera*. British Honduras: *Diplotaxis angustula* or *trapezifera*. Honduras: *Diplotaxis denigrata*, *mistura*, *ohausi*, *poropyge*, *trapezifera*, *yucateca*. El Salvador: *Diplotaxis angustula*, *denigrata*, *macrotarsus*, *mistura*, *ohausi*, *poropyge*, *puncticollis*, *trapezifera*, *yucateca*. Nicaragua: *Diplotaxis poropyge*, *tehuana* (?), *trapezifera*. Costa Rica: *Diplotaxis denigrata*, *guatemalica*, *poropyge*, *trapezifera*, *yucateca*. Panama: *Diplotaxis poropyge*, *zeteki*. None of these species reaches as far north as the United States, but all except the five mentioned above occur also in Mexico. Although the distributional pattern is incomplete owing to the lack of intensive collecting in Central America, it seems evi-

dent that the number of species diminishes both north and south of Mexico.

NEW RECORDS

Since the publication of part 1 (Vaurie, 1958), I have examined many additional specimens of the species discussed in that paper, some of which come from localities not previously mentioned for the species. These new records are listed below. The specimens are in the American Museum of Natural History unless specified otherwise.

Diplotaxis aenea: Three specimens in the United States National Museum labeled "Texas" are undoubtedly this species. The most northern occurrence in Mexico is in the state of Durango.

Diplotaxis arizonica: Known previously from northern Mexico and southern Arizona, this species is represented now by a specimen from Ozona, Texas, in the collection of L. J. Bottimer.

Diplotaxis aulacochela: Also from the collection of Bottimer, I should like to record four males of this species from Glenn Springs and Hot Springs in the Big Bend National Park, Brewster County, Texas. This is not a new record, but I have seen only 12 other specimens of this species from the United States.

Diplotaxis corrosa: This species, known from San Luis Potosi, Hidalgo, and Guanajuato, occurs also in the state of Mexico, as shown by five specimens seen from 6 miles north of Aculco, 6500 feet, August, 1954, in the Canadian National Collection, and from 25 miles east of Mexico City, 8200 feet, September, 1957, in the collection of Oregon State College.

Diplotaxis crinigera: The type of this species is from Guatemala City, and I have specimens from Chiapas in southern Mexico. I have also examined at the United States National Museum nine specimens from El Salvador (from San Salvador and Volcan Conchagua) collected by O. L. Cartwright and P. A. Berry.

Diplotaxis jacala: This species was described in 1958 from a series of 16 specimens from Jacala, Hidalgo. I have seen a male from farther north in Mexico, from Ciudad del Maiz, 4500 feet, in the state of San Luis

Potosi, collected by J. G. Chillcott in August, 1954, and deposited in the Canadian National Collection.

Diplotaxis ohausi: Although reported previously from southern Mexico, Guatemala, and Honduras, this species was not known from El Salvador. I have examined 28 specimens from San Salvador collected by O. L. Cartwright in May, 1958, and two by P. A. Berry in May of 1957, in the United States National Museum.

Diplotaxis pubipes: This species, known from Veracruz north to Tamaulipas and Texas, occurs also in the state of Nuevo Leon, as shown by three specimens examined from Monterrey and one from Cola de Caballo, in the collection of the Instituto Tecnológico y de Estudios Superiores de Monterrey.

Diplotaxis puncticollis: Two additional states of Mexico and the country of El Salvador can be added to the range of this species. The latter is represented by nine specimens from San Salvador collected by P. A. Berry in May, 1957, and O. L. Cartwright, May, 1958, in the United States National Museum. The new Mexican states are Yucatan, where a total of eight specimens were taken at Pisté, Uxmal, and Chichen Viejo by P. and C. Vaurie, June, 1959, and Quintana Roo, where the same collectors took four specimens at Xcan Nuevo, same date.

Diplotaxis rita: A northern and eastern extension of the range of this species is made known by 18 specimens from Xcan Nuevo in the state of Quintana Roo. The type series is from near Tuxtla Gutierrez, Chiapas, and the species occurs also in Guatemala.

Diplotaxis simplex: New records to be added for this species (known from Tamaulipas, Mexico, south to Chiapas and Yucatan) include one male (dissected) from Sarabia in southeastern Oaxaca, May, 1951, in the collection of the Instituto de Biología, Mexico City; 84 specimens from Xcan Nuevo, Quintana Roo, June, 1959 (P. and C. Vaurie), in the American Museum of Natural History, and two from Tikal, Guatemala, in the University of Michigan.

Diplotaxis tarsalis: Although recorded from the state of Mexico, this species has not until now been recorded from the Distrito Federal; I have seen three specimens collected by

W. W. Gibson of the Rockefeller Foundation Program in Mexico City.

SPECIES REMOVED FROM THE GENUS

Melolontha moesta Germar, 1824 (not Say, 1825), according to Burmeister (1855, pp. 257, 264), belongs not to *Diplotaxis*, as considered by Blanchard (1850, p. 170), who also confused it with *moesta* Say [= *liberta* Germar, according to LeConte, 1859a, p. 299], but to the genus *Apogonia* from the East Indies.

MEASUREMENTS

METASTERNUM: In some groups in this paper (*trapezifera*, *misella*, and *truncatula* groups) the length of the metasternum in relation to other parts of the body (either to the length of the second abdominal segment or to the width of the hind femora) means the length taken at the center of the metasternum, whereas in all other groups and in the single species, it means the length measured on the side between the bulbs of the middle and hind coxae.

FRONT TIBIAE AND CLAWS: In stating the position of the third (or basal) outer tooth of the front tibiae (whether it is at, behind, or in front of the middle), I use the apex of the tooth and its distance between the base of the tibia and the apex of the first tooth, or tooth-like, projection. Similarly, for the tarsal claws, I use the apex of the unguis tooth in relation to the base and apex of the claw.

CLYPEUS: It should be borne in mind, in the comparisons of the length of the clypeus to the length of the head, that the head is extruded in some instances so that it then appears longer than when in repose.

EYES: The size of the eyes in relation to the width of the head is estimated across the front of the head, with the head in a more or less horizontal position.

GENITALIA

The genitalia were discussed previously (Vaurie, 1958, pp. 278–280). In the present paper about one-half (72) of the 154 species treated have male genitalia sufficiently distinctive to be illustrated in dorsal (and some in profile) views (figs. 115–229). When the

genitalia of two or more species were found to be virtually similar, only one illustration was made. It must be remembered that the genitalia, as do other characters, may vary, either slightly or strongly, so that one cannot expect exact duplication of any single dissected organ with the figures shown.

SEXUAL DIMORPHISM

For the most part, the sexes can be distinguished as shown in table 2.

In addition to the general characters above, there are many specific male secondary sexual characters which were listed in part 1 of this revision (1958, pp. 278-279). A number of species not included in this list should now be added, as follows:

Additional species in which males have hairy tarsal pads or at least very abundant hairs: *australis*; *hirtipes* (with also larger front tarsi than in females); *incisa*; *juquilensis*; *laevivertex*; *missionaria* (pads on first two segments of hind tarsi only); *roberti* and *tehuana* (on first three segments and hairs not very dense); *blanchardi*, *fulva*, and *urbana* (hairs not so dense but very long).

Additional species in which males have very large tarsal segments: *macrotarsus* (which also has longer claws on the front tarsi than females).

Additional species in which males have a fringe of dense hairs on inner edges of hind

tibiae: *corbula*, *juquilensis* (hairs not so dense), and *urbana*.

Species in which males have the inner apical angles of the basal segments of both the hind and middle tarsi prolonged and/or widened: *exstans*, *kuschei*, and *sinuans*.

EXPLANATION OF CERTAIN TERMS

Antennae: Funicle with six or seven segments but club always three-segmented and lamellate

Bidentate front tibiae: Tibiae with the apical projection and only one outer tooth (figs. 38, 90)

Clypeal angles: At the junction of the outlines of the front and sides of the clypeus as viewed from above; they may be called front angles or lateral angles

Corbel: Ovate area at distal end of tibia, surrounded by fringe of small bristles

Declivity of mentum: A transverse declivous area or a transverse ridge or line of setae separating the front (or distal) part of the mentum from the hind part

Front margin of clypeus: The outline of the distal margin of the clypeus as viewed from above

Ligula: The small sclerite of the labium contiguous to the distal margin of the mentum, only partly visible in repose

Lobes of male genitalia: The lateral lobes or parameres

Reflexed elytral margin: The epipleurae, or turned-down margins of the elytra

Reflexed under side of clypeus: The anterior face of the clypeus, contiguous to the front margin

TABLE 2
GENERAL DIFFERENCES BETWEEN THE SEXES IN *Diplotaxis*

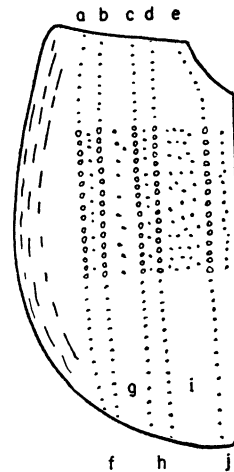
	Males	Females
Basal segment of hind tarsus	Much longer than wide and at least as long as the longer of the two apical spurs of the hind tibia	Not much longer than wide and shorter than the longer spur
Spurs of hind tibia	Narrower, in most cases only one-half of width of spurs of females and often more pointed at apex	Wider, more rounded at apex
Pygidium	More transversely oval	More equal-sided and triangular, with apex slightly pointed
Abdomen	Slightly concave or flattened, fifth segment at middle shorter than fourth	Convex, fourth and fifth segments equal in length, or fifth slightly longer
Hind femora, tibiae, and tarsi	Longer, narrower; tibiae widened gradually to apex; femora less bulbous	Shorter, wider; tibiae widened abruptly at apex; femora often bulbous
Eyes and claws	Somewhat larger	Somewhat smaller
Clypeus	More emarginate; angles sharp	Less emarginate; angles blunt

of the labrum, called the under side because for purposes of examination the beetle must be turned to the under side

Second interval of elytra: The second broad interval counting left from the sutural interval (see fig. 1)

Third (basal) tooth of front tibiae: With apical projection (not a true tooth) counted as the first tooth

FIG. 1. Diagram of disc of left elytron of *Dipllotaxis*, showing costae or ribs, intervals, and paired striae. Symbols: a, b, c, d, e, the punctate striae; f, h, the costae or narrow intervals; g (counting left from suture), the second (broad) interval with single row of punctures (unipunctate); i, the first (broad) interval with more than one row of punctures; j, the sutural interval.



SYSTEMATIC TREATMENT

GENUS *DILOTAXIS* KIRBY (CONTINUED)

KEY TO THE SPECIES AND SPECIES GROUPS¹

(The species marked with an asterisk [*] were discussed in part 1 of the revision, Vaurie, 1958.)

1. Occurring in Martinique, Lesser Antilles (not examined) . . . *ebenina*²
Occurring elsewhere than in Martinique 2
2. Hind tibiae (viewed dorsally) with corbels exposed, apex of tibiae twice as wide as base, and setose carinae oblique to near apex (fig. 54); front of head strongly transversely tumid; southeastern California and Sonora, Mexico (five specimens examined) *corbula* (p. 400)
Hind tibiae with corbels not visible, or, if exposed (as in males of *fossipalpa*), then carinae not so near the apex and head not tumid 3
3. Clypeus with disc hairy (best seen in three-quarter profile view), but remainder of dorsum glabrous, or virtually so (scarcely emerging hairs are here considered glabrous) 4
Clypeus either not hairy on disc, or clypeus as well as some other part of dorsum distinctly hairy or scaly. . . 14

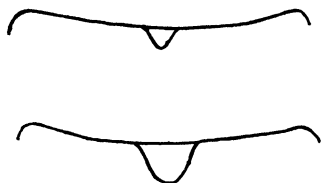


FIG. 2. Small and large scutella of *Diplotaxis*.

4. Scutellum very small, its base about one-fifth or one-sixth of width of one elytron at base (fig. 2); pronotum in front of scutellum depressed; tarsi of both sexes with hairy pads; southern Texas; eastern Mexico
 . . . **pubipes* in part, *puberea* group
Scutellum of normal size; pronotum not depressed in front of scutellum; tarsi hairy or not 5

¹ For the determination of sex, see table 2 under Sexual Dimorphism above. If 15 or fewer specimens of a species have been examined, the fact is so stated.

² See *Incertae Sedis* for this species.

5. Sides of abdomen with a sclerotized longitudinal ridge (often hidden just under edge of elytral margin) (fig. 3) 6
Sides of abdomen smoothly rounded, not ridged 7
6. Clypeus with outline strongly indented at sides in front of eye; front angles of pronotum right-angled; Guatemala; Costa Rica **guatemalica*
Clypeus more or less rounded from eye to eye, not indented; front angles of pronotum acute, produced forward (fig. 74); Arizona
 . . . *pumila*, *truncatula* group (p. 330)
7. Occurring in Panama only (14 specimens seen) **zeteki*, *ohausi* group
Occurring north of Panama 8
8. Occurring in Florida only; head so coarsely and rugosely punctured as to appear pock-marked
 . . . *rufa*, *subcostata* group (p. 350)
Occurring farther west than Florida or in Mexico or Central America; head not as stated above 9
9. Front tibiae with apex of third (basal) tooth behind middle, i.e., nearer base than apex of tibiae (fig. 52), hind femora bulbous and distinctly wider than second abdominal segment is long; Eagle Pass, Texas (three specimens seen) *errans* (p. 264)
Front tibiae, hind femora, and locality not all as stated above 10
10. Species combining following characters: front tibiae bidentate; pygidium very large, with deep, coarse, touching punctures; pronotal front angles acute, drawn forward; males with hairy pads on soles of tarsi; southwestern Oaxaca, Mexico . . *juquilen-*

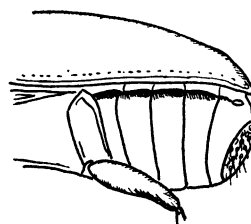


FIG. 3. Hind end of *Diplotaxis*, showing lateral ridge at edge of elytron, terminal spiracle on pro-pygidium (or fifth segment), five abdominal segments, and pygidium.

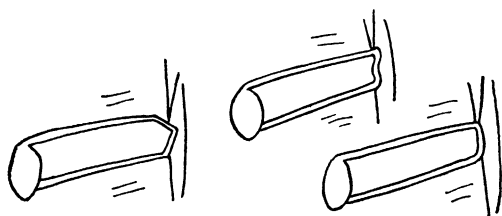
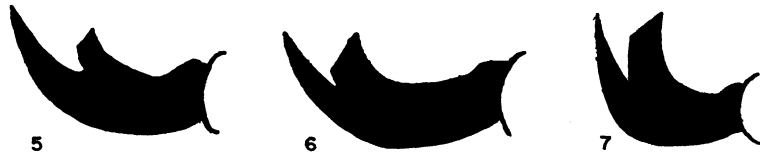


FIG. 4. Angular, truncate, and rounded left hind coxal plates of *Diplotaxis*.

- sis* in part, *juquilensis* group (p. 261)
Species not possessing all of above characters11
11. Propygidium not grooved; sides of hind coxal plate rounded or truncate, not angulate (fig. 4); all but three of 50 species occurring south of United States12
Propygidium grooved transversely just behind pygidium; sides of hind coxal plate with small angulation extending onto reflexed elytral margin; Arizona and New Mexico, occasional in northern Mexico13
12. Basal piece of male genitalia at least one and one-half times longer than lobes (fig. 162); 5.5 to 7 mm.; color pale tawny; eyes sunk below level of head; marginal hairs as long as scutellum; hind femora wider at middle than second abdominal segment is long; canthi as in figure 37; Arizona; Chihuahua and Sonora, Mexico
. *misella*, *misella* group (p. 254)
Basal piece of male genitalia either shorter than lobes or but slightly longer; size, color, eyes, hairs, femora, canthi various (49 species)
. *trapezifera* group (p. 191)
13. Mandibles small, inconspicuous; clypeal hairs (in fresh specimens) abundant; pronotum long (nearly one-half of length of elytra); eyes sunk below sides of head
. *ambigua*, *planidens* group (p. 309)
Mandibles large, bulbous; clypeal hairs sparse in all specimens; pronotum short (about one-third of length of elytra); eyes on same level as sides of head *marginicollis*
in part, *marginicollis* group (p. 316)
- 14(3). Species considered glabrous (no hairs on elytra, exclusive of marginal hairs)15
Species considered hairy or scaly (at least some distinct hairs or scales emerging from elytral punctures) .78
15. Antennae with nine segments only .16
Antennae with the usual 10 segments23
16. Wings vestigial, therefore metasternum short (no longer than second segment of abdomen), scutellum as wide as long, humeral and subapical calluses (or swellings) of elytra lacking; mountains of Arizona (10 specimens seen)
. *saylori*, *connata* group (p. 397)
Wings normal, therefore metasternum and scutellum longer than stated above; elytral calluses present; Arizona and elsewhere17
17. Georgia and Florida; front tibiae virtually bidentate (third tooth, if present, nearer base than apex)
. *languida*, *subcostata* group (p. 351)
Arizona and New Mexico south to Mexico City; front tibiae tridentate (third tooth nearer apex than base or near middle)18
- **hebes* GROUP
18. Ventral segments ridged laterally along elytral margin; Durango, Mexico .19
Ventral segments rounded laterally, not ridged; Durango and elsewhere . .20
19. Pronotal sides not emarginate at base; tarsal claws evenly rounded, toothed near middle (fig. 5) **mima*
Pronotal sides strongly emarginate at base; claws bent abruptly at middle, toothed near apex (fig. 7) (two specimens seen) **contracta*
20. Tarsal claws bent abruptly at middle, toothed near apex, inner tooth as long as claw (fig. 7); Chihuahua south to Guerrero **cribratella*
Tarsal claws evenly rounded, toothed near middle, inner tooth much shorter than claw (fig. 5); Mexico and United States21
21. Pronotum widest at middle, hind angles usually not extending laterally farther than front angles; head without opaque, eroded areas; Chihuahua south to state of Mexico **hebes*
Pronotum widest at base where hind angles either extend laterally well beyond base of elytra, or at least are somewhat flared outward or upward; head often with opaque, eroded areas22
22. Pronotum without median carina; pronotum and head punctured sparsely,



FIGS. 5-7. Three kinds of tarsal claws in *Diplotaxis*. 5. Tooth median or near middle, claw gently curved or evenly rounded. 6. Tooth subapical or in front of middle, claw gently curved. 7. Tooth subapical, as long as claw, claw angularly or abruptly bent.

- United States and northern Mexico **abnormis*
Pronotum with short median carina in front reaching to near base as an impunctate line; pronotum and head very densely punctured; central Mexico (nine specimens seen) . . . **carinata*
23(15). Elytral costae (the narrowest intervals) either impunctate or with one or two punctures on disc, and abdomen at edge of elytral margin with a distinct longitudinal sclerotized ridge (fig. 3); United States, Mexico south to Hidalgo (six species) *truncatula* group (p. 322)
Costae and abdomen not both as stated above 24
24. Scutellum very small, its base about one-fifth or one-sixth of width of one elytron at base (viewed dorsally); tarsi with thick, silky, hairy pads virtually obscuring ventral surface 25
Scutellum of normal size (from one-half to one-fourth of width of an elytron); tarsi with or without hairy pads 26
25. Clypeal angles broadly rounded; sides of clypeus strongly bent inward in front of eyes; Texas to Veracruz **pubipes* in part, *puberea* group
Clypeal angles subacute or dentiform; sides of clypeus straight or but slightly sinuate; Yucatan and Chiapas, Mexico; northern Guatemala **maya*, *puberea* group
26. Metasternum at center third with shallow but distinct round or heart-shaped depression, sides of depression tumid; claws toothed medially; pronotal sides bulging at middle, strongly sinuate before and behind; length, 11 to 14 mm.; Arizona, California; Sonora, Mexico **fossipalpa*, *brevidens* group
Metasternum and sides of pronotum not both as stated above; claws and length variable 27
27. Base of clypeus in front of suture strongly and sharply transversely ridged (nearly from eye to eye); mentum smoothly convex, not transversely ridged; southwestern United States; one specimen, northwestern Mexico *mentalis*, *brevicollis* group (p. 392)
Base of clypeus not ridged, or only faintly tumid either at sides or middle; mentum ridged or not 28
28. Species from western United States of about 8 to 9.5 mm. long with mentum smoothly convex from base to apex without transverse apical declivity; labrum with sides prominent, labrum strongly indented at middle where level with, not advanced from, and no longer than reflexed under side of clypeus; under side of clypeus flat, not furrowed; both mandibles bulbous and longer than labrum; marginal hairs of elytra longer than scutellum; claws gently curved, tooth minute, outstanding, and submedian (well separated from apex of claw) *conformis*, *marginicollis* group (p. 321)
Species not agreeing with all above characters 29
29. Humeral umbone and/or subapical callosities of elytra obsolete because inner wings either rudimentary or short; metasternum not or scarcely longer than second abdominal segment; scutellum usually as wide as long 30
Both humeral umbone and callosities of elytra distinct because wings of normal length; metasternum distinctly (usually twice) longer than second abdominal segment; scutellum usually longer than wide 34
30. Eyes (viewed from below), with large space between inner edge of eye and gular region as much as two and one-

- half times wider than antennal scape; inner wings minute, scarcely longer than a few millimeters; Arizona and New Mexico (four species)
 *connata* group (p. 393)
 Eyes with inner edge separated from gular region by not more than width of antennal scape; wings reduced, but not minute, reaching from base to third or fourth abdominal segment 31
31. Front tibiae bidentate; clypeal margin sharply biangulate; Chihuahua, Mexico
 *brachyptera, misella* group (p. 257)
 Front tibiae tridentate; clypeal margin broadly rounded; United States, and Baja California, Mexico 32
32. Marginal hairs of elytra and hairs of legs twice as long as scutellum; southern California and northern Baja California
 *fimbriata*
 in part, *frondicola* group (p. 298)
 Marginal hairs of elytra and hairs of legs not longer than scutellum 33
33. Pronotum with all angles broadly depressed; second interval of elytra multipunctate; 10 to 14 mm.
 *obscura*
 in part, *brevicollis* group (p. 373)
 Pronotum with hind angles, at least, not at all depressed; second interval of elytra unipunctate; 8.5 to 9 mm.; Idaho only (seven specimens examined)
 *residua, residua* group (p. 342)
- 34(29). Labrum cleft abruptly at middle (longitudinally), thus forming two prominent bulbous lobes at each side; mandibles small, narrow (as in fig. 102) 35
 Labrum flat, convex, or evenly concave, not cleft or bilobed; mandibles large (as in fig. 100) or small 39
- **moerens* GROUP
35. Head bi-impressed between eyes; males with front claws simple, i.e., not, or only minutely, toothed; western United States **anxius*
 Head not bi-impressed; males with front claws toothed as usual 36
36. Head deeply, triangularly impressed at middle behind clypeal suture; lobes of labrum often visible from above; males with first segment of front tarsi twice as large as second; western United States; Baja California and Sonora, Mexico
 **knausii* in part
 Head scarcely, if at all, impressed at middle; lobes of labrum too small to be visible from above; males with no enlarged front tarsal segments 37
37. Ligula and front half of mentum deeply and sharply V-shaped; males with abdominal segments at center with tiny, parallel rugae in transverse rows; Arizona, New Mexico; and Sonora, Mexico **fissilabris* in part
 Ligula and front third of mentum slightly or deeply concave; males with abdominal segments smooth or with paired swellings, but no rugae 38
38. Texas, and Chihuahua, Mexico; head and clypeus usually interrupted by slight swelling or depression in region of clypeal suture **aulacochela*
 Not occurring in Texas or Chihuahua; head usually continuous with clypeus, not interrupted at suture; western United States; and Baja California, Mexico **moerens*
- juquilensis* GROUP
- 39(34). Species characterized as follows: size, 7 to 8 mm.; pygidium virtually impunctate and/or bicallose; clypeus rounded in front from side to side; sides of elytra without visible marginal hairs; state of Guerrero, Mexico (three specimens examined)
 *laevivertex* in part (p. 262)
 Species not agreeing with all above statements 40
40. Species from southwestern mountains of Oaxaca (Juquila) with front tibiae distinctly bidentate, front angles of pronotum small but acute, male with hairy tarsal pads (15 specimens seen)
 *juquilensis* in part (p. 261)
 Species not agreeing with all above statements 41
41. Tarsal soles with thick hairy pads obscuring surface, hind angles of pronotum impressed, and clypeus with front margin truncate between dentiform sharp angles; Arizona south to Jalisco, Mexico (but not Baja California) **tarsalis, puberea* group
 Tarsi with normally hairy soles or, if with hairy pads, then either hind angles of pronotum not impressed or clypeus rounded in front from side to

- side; Baja California and elsewhere 42
42. Labrum entirely convex (fig. 102), not longer than under side of clypeus and not much wider than length of last segment of maxillary palpi, its front and hind margins virtually straight; marginal hairs of elytra so short as to be barely visible; Jalisco and Guana-juato north in Mexico to Durango *convexilabrum* (p. 267)
- Labrum, hairs, and locality not as above. 43
- 43.¹ Species with second segment of abdomen at center with a tiny sharp tubercle; or species from northeastern Mexico south to Central America with *all* of following characters: labrum at least twice as long both at middle and sides as middle portion of under side of clypeus (as in fig. 103), labrum flat, at least in front, where level with, not advanced from, under side of clypeus; latter also flat, not transversely furrowed; costae of elytra punctured densely (at least 20 punctures); if exact length of labrum is in doubt, then front of head, as in *rita*, has either transverse swelling, often interrupted at middle, or as in *simplex*, triangular impression at middle accompanied by transverse swelling in front of clypeal suture, or pronotum, as in *mistura*, has subangulate sides and elytral costae obliterated by punctures 44
- Species from northwestern Mexico or the United States or Canada; and species from regions given above not agreeing with all above statements 55
44. Occurring as far north in eastern Mexico as Tamaulipas and San Luis Potosi 45
- Occurring from Hidalgo in central Mexico, southward, and island of Jamaica 46
45. Labrum flat throughout, its front margin nearly straight; clypeus with front margin scarcely, if at all, emarginate
- . . . **simplex* in part, *simplex* group
- Labrum flat in front only, but strongly concave or hollow behind, front margin strongly arcuate (semicircular); clypeus with front margin broadly emarginate (only one of 69 specimens has been seen from Mexico) *maura* in part (p. 314)
- **simplex* GROUP
46. Second segment of abdomen at center with tiny sharp tubercle or carina; Puebla south to Chiapas and Yucatan **simplex* in part
- Second segment of abdomen smooth or vaguely tumid 47
47. Sides of abdomen with elevated chitinous ridge that may be hidden under margin of elytra (fig. 3) 48
- Sides of abdomen smoothly rounded 49
48. Disc of pronotum finely, sparsely punctured; Puebla, southeastern Mexico (only three specimens examined) **aereomicans*
- Disc of pronotum coarsely, densely punctured; Jamaica, West Indies **jamaicensis* in part
49. Elytra with short sparse hairs on costae (best seen by tipping back specimen); sides of pronotum sinuate at base; Guatemala (only three specimens examined) **alutacea* in part
- Elytra without dorsal hairs; sides of pronotum not sinuate basally . . . 50
50. Base of clypeus strongly or slightly tumid either at middle where suture bends backward angularly, or transversely at sides, and/or head triangularly impressed at middle of front 51
- Clypeus not tumid; head impressed or not (if impressed, then clypeal suture is obliterated at middle) 52
51. Size small (7 to 8 mm.); clypeus with front margin virtually truncate, punctured densely; labrum flat throughout; Puebla, Veracruz, Chiapas, and Yucatan **simplex* in part
- Size large (9.5 to 10.5 mm.); clypeus with front margin bisinuate (distinctly emarginate at middle), punctured sparsely, at least at center; labrum shallowly concave; Puebla and Hidalgo in east central Mexico (only six specimens examined) **fossifrons*
52. Base of pronotum not depressed or punctured differently from rest of pronotum; declivity of mentum flat, not sinuate; El Salvador north to Chiapas and Quintana Roo, Mexico 53

¹ This couplet is important and should be followed carefully.

- Base of pronotum with transverse impunctate area that may be also depressed; mental declivity with surface and hind margin bisinuate . . . 54
53. Front of head with irregular transverse tumidity on sides that is interrupted at middle by a space or a depression **rita*
Front of head smooth or with a slight but continuous frown *mistura* (p. 401)
54. Clypeal suture not visible at middle because of punctures; front of head transversely tumid or carinate, at least at sides; Guatemala; Chiapas, Mexico **carinifrons*
Clypeal suture impressed and bent back angularly at middle, front of head with slight frown following contour of suture; coast of southwestern Mexico (only four specimens examined) **metallescens*
- 55(43). Atlantic and Gulf coasts of United States; prosternal process (between front coxae) bicarinate or tricarinate in majority of specimens; if not, then species with following characters: hind femora bulbous at middle and wider than second abdominal segment is long; front tibiae with third tooth, if present, situated at or behind middle of tibiae (fig. 90); pronotum with sides bisinuate; reflexed margins of elytra as wide from middle to apex at last interval of elytra . . . *subcostata*, *subcostata* group (p. 348)
Prosternal process unicarinate, as is normal; hind femora, front tibiae, pronotal sides, elytra, or range not as given above 56
56. Males with first tarsal segment of middle and/or hind tarsi prolonged on inner side (figs. 95, 96); Mexico; for females continue to next couplet . . . *atramentaria* group in part (p. 331)
Males with first tarsal segments not prolonged; Mexico or elsewhere . 57
57. Species from Mexico with elytral costae either impunctate or with fewer than a dozen punctures on either dorsal costae (not more than six on disc), and second interval of elytra densely multipunctate; marginal hairs of elytra shorter than scutellum . . . *atramentaria* group in part (p. 331)
Species from Mexico with costae either densely, though perhaps finely, punctured (usually 20 to 30 punctures), or, if costae scarcely punctate, then second interval of elytra unipunctate and marginal hairs as long as scutellum; or species from the United States 58
58. Very large species from Baja California, Mexico (13 to 17 mm.) with distinct, minute, secondary punctures among larger punctures of elytra, large eyes (each eye almost one-fourth of width of head), and hind femora impunctate between submarginal rows of punctures *punctulata*, *punctulata* group (p. 345)
Species from Baja California not agreeing with above characters, or species not occurring in Baja California . 59
59. Apex of pygidium (not apex of sixth abdominal segment) with fringe of concentrated yellow hairs and rest of pygidium scarcely hairy; if doubtful, then claws gently curved, tooth minute and widely separated from apex of claw; pronotum with front angles acute; mandibles bulbous and at least as long as labrum; labrum strongly concave; male genitalia as in figures 210, 211; Durango, Mexico. *pygidialis*, *marginicollis* group (p. 320)
Apex of pygidium and pygidium normally hairy; other characters various 60
60. Large species (12.5 to 13 mm.) from Chiapas and Guerrero, Mexico, inland to Morelos, with following characters: pronotum with hind angles bent down (or under) and side margins, especially in basal part, broadly furrowed (fig. 91); elytra with large, deep punctures contrasting strongly with fine, sparse punctuation of pronotum, costae convex and distinct, second interval with two rows of punctures; each eye nearly one-fourth of width of head (four specimens seen) *microchele*, *punctulata* group (p. 346)
Species not agreeing with all of above statements 61
61. Labrum distinctly concave or hollow throughout, about twice as long as, and either level with or sunk below, the reflexed under side of clypeus; under side of clypeus flat and short, no longer at middle than widest part of last segment of maxillary palpi . 62
Labrum and under side of clypeus not both as stated above 63

62. Labrum densely and coarsely punctured, its front margin scarcely, if at all, arcuate; southwestern United States and northwestern Mexico *marginicollis* group (p. 315)
Labrum faintly and finely punctured, its front margin strongly arcuate (as in arc of a circle); Texas, New Mexico and northeastern Mexico *maura* in part (p. 314)
63. Species with under side of clypeus either shallowly or deeply transversely depressed or undercut, depression following contour of front margin of labrum; Canada; United States; and Mexico, but not farther south than Hidalgo in east and Zacatecas in west 64
Species with under side of clypeus entirely flat; Canada south to Central America 66
64. Furrow of under side of clypeus shallow, vague, indistinct; Baja California and elsewhere *frondicola* group in part (p. 268)
Furrow of under side of clypeus deep, distinct, unmistakable; not in Baja California 65
65. Labrum impunctate or faintly punctate, either concave and much longer than under side of clypeus, or convex . . . *brevicollis* group in part (p. 353)
Labrum densely punctate, concave, and shorter than under side of clypeus; western Canada south to northern California *tenebrosa, residua* group (p. 344)
- 66(63). Labrum rather convex and (in repose) with front margin slightly advanced beyond under side of clypeus *frondicola* group in part (p. 268)
Labrum flat or concave, front margin on same level as under side of clypeus 67
67. Clypeus with front margin evenly rounded from side to side (as a spatula, semicircle, or flattened semicircle) with perhaps very slight emargination at middle (figs. 36, 39-43); United States south to central Mexico (Jalisco, Guanajuato, Puebla), including Baja California *frondicola* group in part (p. 268)
Clypeus more or less trapezoid, front margin either distinctly emarginate or truncate at middle, with sharp or dentiform or prominent lateral angles (figs. 10-16, 35, 37); United States to Guatemala, excluding Baja California 68
68. United States and northern Mexico (Chihuahua, Durango, Coahuila, Nuevo Leon) 69
Central Mexico (Hidalgo, Mexico, Morelos, Michoacan) south to Guatemala and El Salvador 74
69. Pronotum with front and hind angles impressed; not occurring in Texas . 70
Pronotum with angles not impressed; Texas and elsewhere 71
70. Labrum shallowly concave, of about same length as under side of clypeus; mandibles thick and bulbous, as long as labrum; New Mexico, Arizona . . . *parallela, brevicollis* group (p. 387)
Labrum flat, one and one-half times to twice as long as under side of clypeus; mandibles thin and flat, shorter than labrum; Durango, Mexico *elongata* (p. 405)
71. Pronotum with hind angles rounded off (line of pronotum continuous from sides to base), not angulate (as in figs. 14-16); 5.5 to 7 mm. (but one species to 9 mm.); male genitalia with basal piece much longer than lobes (fig. 162) *misella* group (p. 253)
Pronotum with hind angles distinctly angulate, breaking outline of pronotum (angles obtuse); 8 to 12.5 mm. (but one species only 7.5 mm.); male genitalia with basal piece slightly or not at all longer than lobes 72
72. Labrum virtually impunctate and as long as under side of clypeus, nearly as wide as front margin of clypeus, front margin of clypeus scarcely reflexed *brevicollis* group in part (p. 353)
Labrum densely punctate and shorter than under side of clypeus, about one-third of width of front margin of clypeus; front of clypeus broadly reflexed 73
73. Small (7.5 to 8 mm.), pronotum flat, narrow; elytra so densely and irregularly punctured that costae and intervals are confused, not distinct (only three specimens examined) *schaefferi* (p. 259)
Large (8 to 12 mm.), pronotum very convex, nearly as long as one-half of length of elytra; elytra (except first broad interval) with regular single rows of large, well-separated punctures *beyeri* (p. 266)
- 74(68). Males with longer spur of middle tibiae strongly curved and only one-fourth

- of length of basal tarsal segment; females with longer spur of hind tibiae spatulate apically; state of Mexico (five specimens seen)
 *amecameca* (p. 263)
 Both sexes with tibial spurs straight and acuminate, longer spur of middle tibiae at least one-half of length of basal tarsal segment75
75. Front of head behind clypeus flat; clypeus truncate in front; Chiapas, Mexico, south to El Salvador and Honduras . . . **ohausi, ohausi* group
 Front of head transversely tumid either because head is advanced slightly over clypeal suture or because of actual ridge; clypeus usually strongly emarginate in front; north of Chiapas76
76. Smaller (7 to 8 mm.); front of head with ridge elevated, irregular in shape, broken at middle, surface and punctures of head uneven; pronotum rather flattened, especially at sides, punctures large, some confluent; pygidium divided at middle or with surface tuberculate; southeastern Mexico (six specimens seen)
 *veracruzana* (p. 404)
 Larger (8.5 to 11 mm.); front of head with ridge very slightly swollen, even and regular across front, punctures and surface smooth, uniform; pronotum convex, punctures fine, uniform; pygidium not divided or tuberculate, but uniformly punctured; northeastern or central western Mexico77
77. Hind femora virtually impunctate between submarginal rows of punctures; pronotum with punctures of disc smaller than those of head, scarcely impressed, base not impressed; lateral lobes of male genitalia in profile strongly arcuate (fig. 226); Hidalgo . . . *turgidula* (p. 406)
 Hind femora with two rows of punctures between submarginal rows; pronotum with punctures of disc larger than those of head, deeply impressed, base transversely impressed; lateral lobes of male genitalia straight, horizontal; Michoacan and Guerrero (three specimens examined)
 *assimilis* (p. 410)
- 78(14). Elytral costae virtually impunctate; Arizona; Texas; Chihuahua, Mexico **arizonica*
 Elytral costae densely punctate, often not distinguishable from other (broader) intervals79
79. Tarsal claws simple, not toothed; antennae nine-segmented; central United States . . **rudis, rudis* group
 No more than two pairs of claws, if any, simple; antennae 10-segmented80
80. Labrum cleft medially, bilobed . . .81
 Labrum flat or concave, not bilobed .86
81. Abdomen with longitudinal chitinous ridge on sides (fig. 3), at least on first segments (elytra can be pulled away with bent pin)82
 Abdomen not ridged laterally . . .84
- **cribulosa* GROUP
82. Middle and hind tibiae with obsolete setose carinae composed of only two spines on outer edge of tibiae, tibiae scarcely constricted before apex; Sonora, Mexico (known only from type) **obregon*
 Middle and hind tibiae with outstanding setose carinae of from four to six spines extending more than halfway across face of tibiae83
83. Abdomen with lateral ridge weak and present on only first three segments, occasionally on fourth; southwestern United States south to Jalisco
 **cribulosa*
 Abdomen with lateral ridge distinct, strong, and present on all segments; southern Arizona, northern Sonora **mimosae*
- 84(81). Labrum tiny, shallowly cleft, shorter than one-half of length of under side of clypeus; dorsal hairs long, readily visible; 8 mm.; Texas (four specimens examined) . . **rex, rudis* group
 Labrum prominent, deeply cleft, longer than under side of clypeus; dorsal hairs scarcely visible; 9 to 12 mm.; southwestern United States, but not in Texas85
- **moerens* GROUP
85. Head deeply, triangularly impressed at middle; lobes of labrum often visible from above . . . **knausii* in part
 Head scarcely, if at all, impressed at middle; lobes of labrum too small to be visible from above
 **fissilabris* in part
- 86(80). Dorsum, at least in part, clothed with coarse, usually white, usually depressed scales or scale-like hairs .87
 Dorsum and venter clothed, at least in part, with fine, yellowish, usually semi-erect or erect hairs90

87. Clypeus rounded from side to side as a semicircle, its front margin not reflexed; Arizona; Chihuahua . . . **mus*
Clypeus trapezoid or quadrate in shape, angulate at sides in front, front margin strongly reflexed; Mexico state south to Oaxaca88
88. Each eye, seen from above, less than one-sixth of width of head; elytra with striae punctures bare of hairs; antennal club usually black; northwestern Oaxaca
. **clypeata, aenea* group
Each eye about one-fourth of width of head; elytra with hairs in all punctures; antennal club tawny or reddish; Oaxaca north to Colima and Michoacan89
- *pilifera* GROUP
89. Males with first segment of middle tarsi equal in length and width to second and not spined; females with pygidium flat or convex . . . **hallei*
Males with first segment of middle tarsi only one-half of length of second, widened apically, and with a spiny projection on inner side; females with pygidium deeply, abruptly concave **pilifera*
90(86). Occurring in Jamaica, West Indies . . . **jamaicensis* in part, *simplex* group
Occurring elsewhere than in Jamaica91
91. Elytral surface with irregular rugose swellings, elytral hairs erect, four times longer than those on pronotum, not present in striae; Guatemala (known only from type) . . . **aurata*
Not exactly as stated above92
92. Clypeal margin evenly rounded from side to side, either as a flattened semicircle or as a rather truncated oval (figs. 33, 39-43); if doubtful, then margins not reflexed by more than width of margin93
Clypeal margin broken either by slight or strong emargination, or by obtuse or dentiform front angles97
93. Pronotum with sides bulging at middle, thence sinuate to base and apex; Guatemala (three specimens examined)
. . . **alutacea* in part, *simplex* group
Pronotum with sides evenly rounded from base to apex; northern Mexico, United States94
94. Head with large, sparse punctures; clypeus with smaller, dense punctures; tarsal soles very hairy; 6 to 7 mm.; Texas
. . . *brevisetosa, frondicola* group (p. 280)
Head and clypeus with uniform, dense punctures of same size; soles of tarsi with normal, scattered hairs; 7 to 12 mm.; Texas and northern Mexico .95
95. Pygidium coarsely, reticulately punctured, surface uneven; propygidium grooved deeply between spiracles; tarsi not or scarcely longer than tibiae; northern Mexico north into southwestern United States
. . . *muricata, frondicola* group (p. 296)
Pygidium finely, densely punctured, surface smooth; propygidium not grooved; tarsi distinctly longer than tibiae; northern Mexico96
- *rockefelleri* GROUP
96. Head and pronotum with hairs scarcely visible; elytral hairs quite sparse; costae of elytra with punctures at least twice as widely separated as punctures of striae; Durango
. **rockefelleri*
Head, pronotum, and elytra abundantly hairy; costae of elytra with punctures as dense as those of striae; Chihuahua and Durango . . . **indigena*
- 97(92). Soles of tarsi with thick hairy pads that hide surface beneath; 10 to 12.5 mm.; not in United States98
Soles of tarsi with usual scattered hairs; United States and elsewhere104
- *puberea* GROUP¹
98. Angles of clypeus rounded, front margin distinctly emarginate; Hidalgo, San Luis Potosi **jacala*
Angles of clypeus dentiform, obtuse, or subacute, front margin truncate or slightly emarginate; not in northeastern Mexico99
99. Front tibiae with basal (third) tooth just slightly in front of middle of tibiae; males with basal segment of middle tarsi prolonged into spiny projection at inner apex; Oaxaca
. **spina*
Front tibiae with all three teeth in apical third of tibiae; males without prolongation of tarsal segments;

¹ Most of the species of this group cannot be identified without an examination of the males. These are two additional species of the group that are glabrous and appear earlier in the key.

- Oaxaca and elsewhere 100
100. Guatemala; males with last segment of maxillary palpi and segments of tarsi dilated; inner claw of front tarsi elongate, scarcely cleft . **brevipilosa*
North of Guatemala; males with characters not all as stated above . 101
101. Punctuation usually large, coarse; surface usually shining; front of clypeus emarginate; males with last segment of maxillary palpi normal but segments of front tarsi widely dilated (wider than those of other tarsi); Veracruz northwest across central Mexico to Nayarit 102
Punctuation small, fine; surface often sericeous; front of clypeus scarcely emarginate; males with last segment of maxillary palpi slightly or strongly dilated, but segments of front tarsi normal (as narrow as on other tarsi); Chiapas northward on west coast to Michoacan and Durango 103
102. Clypeus with front angles usually subacute; male genitalia with center space between lateral lobes narrower than either lobe; Veracruz, Oaxaca, ?Puebla **microtichia*
Clypeus with front angles usually dentiform; male genitalia with center space wider than either lobe; Nayarit, also central Mexico . **simillima*
103. Males with lateral lobes of genitalia as long as middle tibiae and joined on inner side at basal fourth; maxillary palpi with last segment widely, triangularly dilated; southern Durango, Michoacan **bowditchi*
Males with lobes of genitalia shorter than middle tibiae and joined at about basal sixth or eighth; maxillary palpi with last segment slightly dilated; Michoacan south to Chiapas **puberea*
- 104(97). Canada and eastern United States (east of Mississippi River) 105
West of Mississippi River (Texas, Louisiana, New Mexico, California), or Mexico and Central America 106
- *sordida* GROUP
105. Front angles of pronotum acute and drawn forward; disc of pronotum densely punctured; humerus of elytra hairy, densely punctured; Alabama and elsewhere **sordida*
Front angles of pronotum obtuse; disc of pronotum irregularly punctured; humerus of elytra glabrous, usually impunctate; Mobile, Alabama **vandykei*
106. Head and pronotum virtually bare of hairs 107
Head and pronotum distinctly hairy (if hairs worn, some can usually be seen when viewed in profile) 110
107. Sides of abdomen rounded, not ridged; clypeus shallowly bisinuate, its front angles broadly rounded, scarcely reflexed; United States; northeastern Mexico 108
Sides of abdomen with sharp edge or an actual ridge; clypeus either deeply emarginate, with angles broadly lobed and reflexed, or rather truncate and with bluntly dentiform angles; western Mexico or Guatemala 109
108. Elytra with marginal hairs much shorter than scutellum, and dorsal hairs visible, if at all, only on sides; New Mexico, Texas; Tamaulipas, Mexico . . . *maura* in part (p. 314)
Elytra with marginal hairs longer than scutellum and dorsal hairs long and evident; California (known only from type and paratype) **dahli*, *brevicollis* group (p. 377)
109. Pronotum with front angles rectangular or obtuse; dorsal and marginal hairs of elytra minute, scarcely emerging from punctures; front of head flat or concave; Guatemala; Costa Rica **guatemalica*
Pronotum with front angles acute and drawn forward; dorsal hairs of elytra longer than stated above and marginal hairs as long as scutellum; front of head convex; Nayarit, western Mexico **rugosifrons*
- *puberula* AND *pilipennis* GROUPS¹
- 110(106). Sides of abdomen with longitudinal chitinous ridge, or at least a shining keel (in some specimens hidden under margin of elytra) 111
Sides of abdomen smoothly rounded, without trace of ridge or keel . 113
111. Elytra with striae punctures virtually bare of hairs (at least not visible at $\times 14$ power) and pronotum with hairs

¹ To ascertain whether hairs are present in striae (or other) punctures, specimen should be tipped backward. The striae separate the narrow intervals (the costae and the sutural interval) from the broad intervals.

- visible only in profile view; labrum generally longer than under side of clypeus at middle; Veracruz and Yucatan, Mexico, south to Panama **poropyge* in part
- Elytra with all punctures (striae and intervals) distinctly hairy (hairs short or long); if striae punctures worn bare, then pronotum with hairs distinctly visible in dorsal view; labrum of same length as under side of clypeus at middle 112
112. Elytra with pubescence depressed, very short (no longer than distance between punctures); front of head abruptly and deeply excavate; Chiapas, Mexico; Guatemala . . . **cavifrons*
- Elytra with pubescence (at least on some intervals) erect and longer than scutellum; front of head flat or gently concave; Chiapas, Mexico; Guatemala; El Salvador . . . **crinigera*
113. Elytra with punctures of every row hairy 114
- Elytra, at least in apical half, with punctures of striae virtually bare of hairs, especially stria next to suture (fig. 1) 119
114. Clypeus with front angles sharply or bluntly dentiform; sides of pronotum often constricted or indented in front of hind angles; Michoacan **selanderi*
- Clypeus with angles broadly rounded, more or less bilobed, or rounded from side to side; sides of pronotum evenly arcuate to hind angles 115
115. Mandibles bulbous and prominent; labrum flat, distinctly longer than reflexed under side of clypeus and densely, strongly punctured; Louisiana, Texas, and northeastern Mexico **puberula*
- Mandibles rather flat, inconspicuous; labrum either shorter than or equal in length to under side of clypeus and punctured as above, or longer than under sides of clypeus but finely and shallowly, it at all, punctured . 116
116. Front of head flat or concave; females with spurs of hind tibiae narrow, thread-like (fig. 27) 117
- Front of head with slightly transverse tumidity or frown behind clypeus; females with spurs of hind tibiae about as wide as basal segment of tarsi (fig. 26) 118
117. Clypeus shorter than head (usually about one-half of the length); hind angles of pronotum forming an obtuse angle; hairs on suture and some other intervals at least twice as long as hairs in striae; eastern Mexico south to El Salvador . . **puncticollis*
- Clypeus usually about as long as head; hind angles of pronotum rounded off without angulation; elytral hairs all of same length; western Mexico; also one specimen from Veracruz **coriacea*
118. Pronotum with punctures extending all the way to base without impunctate space or depression across base, side margins with bulge nearer middle; northeastern Mexico south to Guatemala **hirsuta*
- Pronotum with convex impunctate space or depression across base (best seen by tipping specimen forward), side margins with bulge nearer base; northeastern Mexico south to Veracruz **subrugata*
- 119(113). Clypeus markedly quadridentate (fig. 13), its front margin black and strongly reflexed; Oaxaca . . **zapoteca*
- Clypeus bidentate or bi-angulate, front margin may or may not be black and strongly reflexed 120
120. Panama north to southern Mexico (Yucatan, Chiapas, southern Veracruz); clypeus with sides indented angularly in front of eyes, thence nearly parallel to front margin **poropyge* in part
- Central Mexico (Michoacan and Mexico state) north to northwestern Mexico; clypeus with sides either outwardly sinuate or straight in front of eyes, thence oblique to front margin 121
121. Small (7 to 8.5 mm.), pale tawny; pronotum short (less than one-third of length of elytra); Jalisco north to Chihuahua **pilipennis*
- Either size larger (9 to 11 mm.) or color darker (deep red to black); pronotum proportionately longer (one-third or more of length of elytra). 122
122. Mentum flat, without apical declivity; elytral striae in some specimens with hairs near apex; Michoacan and Mexico **tarascana*
- Mentum declivous in front; elytral striae always bare of hairs; Nayarit and Durango **costanera*

SPECIES GROUP *TRAPEZIFERA*

The following 49 species are included in this group in the order in which they are discussed:

SECTION 1: *Diplotaxis denticeps* Bates; *fissilis* Vaurie and Cazier; *angularis* LeConte; *chiricahuae* Fall; *mediafusca*, new species; *hirtipes*, new species; *cribraticollis* Blanchard; *trapezifera* Bates; *denigrata* Bates; *megapleura*, new species; *angustula* Moser; *tehuana*, new species; *concava*, new species; *bicolor* Bates; *tepicana* Moser; *sonora*, new species; *latispina*, new species; *macrotarsus*, new species; *incisa*, new species; *pala*, new species; *roberti*, new species; *femoralis*, new species; *nigri-ventris* Bates; *yucateca*, new species; *tumida*, new species; *consentanea* Bates; *crucis*, new species.

SECTION 2: *Diplotaxis superflua*, new species; *catarinas* Vaurie and Cazier; *glabrimargo* Vaurie and Cazier; *saltensis*, new species; *dissona*, new species.

SECTION 3: (Baja California, endemic species.) *Diplotaxis polita* Fall; *parpolita*, new species; *mascula*, new species; *flexa*, new species; *confusa* Fall; *academia*, new species.

SECTION 4: *Diplotaxis parvula* Burmeister; *sparsa*, new species; *cribriceps* Bates; *marina*, new species; *durango*, new species; *bifida*, new species; *rufipes* Moser; *iguala*, new species; *corrosa* Bates¹; *aenea* Blanchard¹; *clypeata* Bates.¹

The earliest names in this group are *cribraticollis* and *aenea* Blanchard,¹ 1850, and even *angularis* LeConte, 1856, is earlier than the name given above to the group. Nevertheless, in this instance I use Bates's *trapezifera* because it has been associated in print with this group of *Diplotaxis* (Bates, 1887–1888; Moser, 1918, 1921; Vaurie and Cazier, 1955; Vaurie, 1956). Approximately 13,500 specimens have been examined (including 527 of the former *aenea* group), the majority being of two species (*angularis* and *denticeps*). Almost half of the species (26) are described as new. The types of all the forms have been examined, with the exception of those of the two Blanchard species (*aenea* and *cribraticollis*) which were not found in the Paris Museum where supposedly they were deposited.

The species of this large group are characterized principally by having hairs visible on the clypeus but not on the rest of the dorsum,²

¹ These species were treated in part 1 (Vaurie, 1958) as the *aenea* group.

the hairs being usually readily visible from a three-quarter or a profile view. Unfortunately such visibility of the hairs cannot be used as a generic or subgeneric character for a number of reasons. Some species with clypeal hairs have other characters that seem to differentiate them from the majority of the members of the group (see below); some species have hairs present on the front edge only of the clypeus or only a scattered hair here and there behind the front edge. Another reason that the combination of hairy clypeus and glabrous dorsum cannot be used as a rigid character for the separation of genera is that the "glabrous dorsum" is in fact not truly glabrous, and the elytra have minute hairs in many "glabrous" species throughout the genus. Two species of the present group (*clypeata*, *chiricahuae*) have hairs sufficiently visible for them to be classed also as dorsally hairy species, but they have been kept in this group because of other similarities with it members.

CHARACTERS OF THE *trapezifera* GROUP

The species of the group are from 5 to 11 mm. long, usually tawny or reddish in color, less often black or dark red. The characters that follow are the same in all the species, so are not necessarily repeated in the descriptions.

Clypeal suture variable within species in its presence or absence at middle. Clypeus hairy, in some specimens only behind front edge. Antennae 10-segmented. Mandibles small. Maxillary palpi variable in the presence of an impression at base of last segment. Costae of elytra with a single row of punctures that are smaller and sparser than those of the intervals or striae (except in *marina* and some species in the section with *superflua*), suture of elytra with single row of punctures except in *parvula*. Scutellum with variable punctures. Abdomen not ridged laterally; fifth segment (propygidium) without groove or ridge behind pygidium. Hind coxal plate margined laterally (except in

² *Diplotaxis aenea* and the *aenea* group were treated as a distinct group in part 1 of this revision (Vaurie, 1958) but are now considered to be a part of the *trapezifera* group. Two of the species (*aenea* and *corrosa*) have a few hairs on the elytra, and the third (*clypeata*) is distinctly hairy dorsally.

some species endemic to Baja California), and rounded or truncate, not angulate (slightly angulate in specimens from Baja California). Claws bent abruptly, cleft subapically, ungual tooth almost as long as claw and close to it.

SEXUAL DIMORPHISM: See under *denticeps*.

In addition to the characters given above that are common to all species of the group, there are some characters that are common to the majority of the species. Thus most species have the pronotal sides strongly arcuate, their front angles right or obtuse, the elytra three times longer than the pronotum, the clypeus angulate or dentate, the eyes rather large and not or but slightly sunk, the third tooth of the front tibiae at or in front of the middle, the front of the head flat or depressed, and the mentum flat. Other differences among the species are: whether the labrum is flat or concave, whether the second interval of the elytra has one or two rows of punctures, whether the marginal hairs are long or short, and whether the lobes of the male genitalia are shorter or longer than the basal piece.

Notations on biology or habitat are available on only 11 of the 49 species. These appear after the ranges in the descriptions that follow for the species *denticeps*, *angularis*, *chiricahuae*, *trapezifera*, *megapleura*, *angustula*, *bicolor*, *macrotarsus*, *marina*, *bifida*, and *iguala*.

COMPARISON WITH SPECIES OF OTHER GROUPS

A number of species might have been included in this group because they possess the character of the hairy clypeus, but I have placed them, rather, in other groups with which they seem to agree more strongly. These species and the way in which they differ from those of the present group are as follows: *Diplotaxis rufa* Linnell (known from Florida only; *subcostata* group), a species differing by having the third (basal) tooth of the front tibiae very small and closer to the base than to the apex; *errans* Fall (*errans* group), with the basal tooth also closer to the base but very large and the hind tibiae strongly widened; *pumila* Fall (*truncatula* group), and *guatemalica* Moser¹ (*guatemalica*

group), two species with the sides of the abdomen strongly ridged, *pumila* having the elytral costae virtually impunctate, *guatemalica* having the male genitalia as in *misella* Fall (*misella* group), i.e., the basal piece nearly twice as long as the lobes; *ambigua* Fall (*planidens* group), by having a transverse groove above the pyridium and the males with modified middle tarsal claws; *pubipes* Schaeffer¹ (*puberea* group), by having a tiny scutellum, and the pygidial groove as in *planidens*. The two species of the *ohausi* group¹ have long straight hind femora and tibiae, and, in the male, modified front claws; *ohausi* has hairy pads on the tarsi in both sexes. A few specimens of *marginicollis* Fall (*marginicollis* group) have scattered clypeal hairs, but this species differs by having a groove on the propygidium and a distinctive hollow labrum; *juquilensis* Bates also has only a few clypeal hairs, bidentate front tibiae, and no visible hairs on the elytral margins.

DISTRIBUTION OF THE SPECIES

All the species of the group occur in Mexico. Only two (*angularis*, *chiricahuae*) cross into the United States, although one specimen of a third (*denticeps*) has been taken in southern Texas. Seven species occur farther south than Mexico as well as in Mexico. Six species are endemic to Baja California. A number of species are wide-ranging and occur in many states of Mexico (*aenea*, *angularis*, *consentanea*, *denigrata*, *denticeps*, *megapleura*, and *trapezifera*); some are apparently confined to the extreme north of Mexico (*catarinas*, *chiricahuae*, *dissona*, *fissilis*, *glabrimargo*, *saltensis*, and *superflua*); and one (*yucateca*) does not occur north of Chiapas and Yucatan. The states of Mexico in which the majority of species occur are Guerrero and Oaxaca, with 16 species each, and Michoacan and Durango, with 10 each. I have not seen any species of the group from the northeastern states of Nuevo Leon, Tamaulipas, and Coahuila, or from the southeastern state of Tabasco, the last two states being ones in which very little collecting has been done.

In contrast to the other species of the genus, most of which inhabit the highland region from southwestern United States south to

¹ Discussed in part 1 (Vaurie, 1958).

¹ Discussed in part 1 (Vaurie, 1958).

Guanajuato and Queretaro and eastern Jalisco, the greatest number of species in this group occur in the central mountainous region south of the above area (23 of 49 species) and in the region of the Isthmus of Tehuantepec and Chiapas (20 of 49), with some duplication. The percentages of species of the *trapezifera* group occurring in the various regions of Mexico and southward are given below (see discussion of regions in Introduction).

REGIONS	PER CENT
South central mountainous	47
Isthmian and southern	39
Highland	27
Pacific coastal	25
Baja California and Sonora	20
Guatemala and Central America	10
Eastern coastal	9
Yucatan	6

TREATMENT

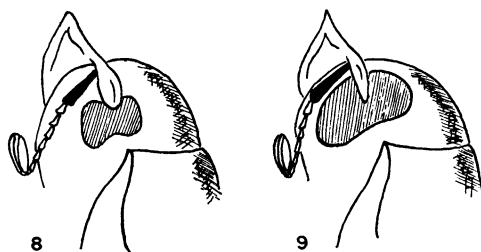
For convenience, this group has been divided into four sections, but the majority of species are in the first section. All the species appear in the key below. Some of the species cannot be identified without reference to the genitalia of the male. The short diagnosis in the description includes the same characters for each species and is intended as a quick check on the general aspect of the beetle. In this group, therefore, the range has been placed before the diagnosis.

Some of the characters given above (the palpi and clypeal suture), although apparently of little significance in this group, are nonetheless given in the descriptions of lectotypes or new forms, because they are important in some other parts of the genus. The claws are given only in *macrotarsus* and *iguala*, in which they differ slightly from the form usual for the group. The hind coxal plate is mentioned only in the section of the endemic California species, and in *bifida* and *rufipes*. The actual figures of the male genitalia of *consentanea*, *denigrata*, *denticeps*, and *nigriventris* were not made from the type or syntypes, although sketches were made at the time of their examination. The marginal hairs are judged at the middle third of the elytra, because the hairs become progressively shorter from the base to the apex of the elytra. In the descriptions the hairs are

considered short whenever they are the same length as, or shorter than, the width of one sutural interval, and long whenever they are longer than this interval; some species have hairs longer than the scutellum. The measurement of the metasternum was taken at the middle, not from the bulbs, of the coxae.

KEY TO THE SPECIES OF THE *trapezifera* GROUP

1. Species occurring in Baja California . . . 2
Species occurring elsewhere 7
2. Front of head impressed, concave, or flattened at middle behind clypeus; clypeus slightly tumid at middle; most of Baja California 3
Front of head convex behind clypeus or at least not concave; clypeus flat; restricted to Cape region of Baja California 4
3. Marginal hairs in fresh specimens longer than scutellum and dense; sides of pronotum abruptly bulging at or behind middle (fig. 46), the front angles not acute or produced; punctuation of elytra coarse, deep, second interval usually confusedly punctate in two rows *confusa*
Marginal hairs not much longer than the width of a sutural interval and sparse; sides of pronotum strongly but evenly arcuate, the front angles acute and produced; punctuation of elytra shallow, fine, second interval usually with single row of punctures *academia*
4. Margin of pronotum interrupted and partially concealed at hind angles which are bent downward and under (fig. 45); sides of hind coxal plate angulate, the angles fitting over edge of elytral margin (fig. 4) *flexa*
Margin of pronotum readily visible at hind angles; sides of hind coxal plate rounded or truncate, not extending onto elytral margin 5
5. Male genitalia with basal piece same length at lobes, and lobes as in figures 150 and 156 (three specimens examined) *parpolita*
Male genitalia with basal piece longer than lobes 6
6. Male genitalia as in figures 146 and 147 *polita*
Male genitalia as in figures 143 and 148 (five specimens examined) *mascula*
- 7(1). Labrum cleft at center, bilobed (fig. 34); front margin of clypeus more or less rounded from side to side (fig. 33); southern Mexico *bifida*



FIGS. 8, 9. Lateral views of head and clypeus of *Diplotaxis*, showing antennae, comparative size and shape of eyes, and width of gular region (head is shown pulled out of thorax). 8. Small, widely separated, kidney-shaped eyes and wide gular region. 9. Large, narrowly separated eyes and narrow gular region.

- Labrum flat or concave or slightly convex, not cleft; clypeus of various shapes . . . 8
8. Hind femora abruptly angulate at middle on lower edge (fig. 29); size small, 6 mm.; Colima, Michoacan (only five specimens examined) . . . *femoralis*
Hind femora straight or gently sinuous on lower edge (fig. 30); size small or large. 9
9. Eyes small, widely separated (each eye about one-sixth of width of front of head), rather flattened on sides (fig. 8) and three-fourths hidden by front angles of pronotum, inner edge of eye, seen from below, widely separated from gular region in three of the species; not usual in the United States, but three specimens are labeled "Texas" . . . 10
Eyes large, closer together (each eye one-fourth or one-fifth of width of front of head), strongly bulbous on sides, inner edge of eye, from below, close to gular region (fig. 9); in United States or southward . . . 14
10. Marginal hairs of elytra as long as or longer than scutellum; in some specimens minute hairs present on elytra . . . 11
Marginal hairs of elytra not or scarcely longer than width of one sutural interval; elytra without dorsal hairs . . . 13
11. Antennal club reddish or tawny; pronotum with front angles rectangular or obtuse; coast of Oaxaca . . . *marina*
Antennal club black or darkened; pronotum with front angles acute or at least drawn forward . . . 12
12. Pronotum with punctures very fine, usually much smaller than those of elytra, and surface smooth; base often with transverse, convex, impunctate line; in bicolored phase, elytra without black

except on scutellum; Oaxaca and all of central Mexico north to Durango and "Texas" . . . *aenea*¹

- Pronotum with punctures large, coarse, and rather confluent, as are those on elytra also, and surface rugose; base usually densely punctured as on rest of dorsum; in bicolored phase, elytra with two longitudinal black or dark stripes in center and on margins, and tawny stripes between; northeastern and central eastern Mexico . . . *corrosa*¹
- 13(10). Clypeus narrow, front angles dentiform or at least sharply angulate (fig. 35), margins, especially front margin, distinctly indented; small, 6 to 7 mm.; Guerrero, Morelos, western Oaxaca . . . *iguala* in part
Clypeus broad, with broadly rounded front angles; front margin truncate, or virtually so; medium, 7 to 9 mm.; localities as above, also Colima . . . *cribriceps* in part
- 14(9). Small species (5 to 8 mm.) of northern distribution in Mexico (Chihuahua, Durango, Nayarit) with distinctly tooth-like, acute angles on front margin of clypeus, the latter being scarcely, if at all, emarginate; marginal hairs of elytra shorter than width of a sutural interval; labrum concave . . . 15
Species not exactly as above . . . 17
- 15.² Eyes small (each eye one-fifth of width of head); marginal hairs of elytra usually not visible; sides of pronotum strongly arcuate, widest at middle . . . *glabrimargo*
Eyes larger (each eye at least one-fourth of width of head); marginal hairs of elytra always visible; sides of pronotum gently arcuate, widest behind middle . . . 16
16. Front outline of clypeus with slight, sinuate, tooth-like projection between angles in 90 per cent of specimens; head usually black or darkened; eyes sunk below level of head; front of head usually tumid and abruptly declivous behind concavity, which is usually deep; male genitalia as in figures 123 and 158 . . . *catarinas*
Front outline of clypeus not at all sinuate; head tawny; eyes not sunken; front of

¹ These species are discussed in part 1 of the revision (Vaurie, 1958) under the name of the *aenea* group. The third species, *clypeata*, has thick dorsal hairs.

² The following three species are so similar externally that dissection of the male is recommended.

- head smooth and oblique behind concavity, which is shallow; male genitalia as in figures 125 and 160 . . . *superflua*
- 17(24). Clypeus more or less quadridentate, or at least side margins strongly outwardly sinuate-arcuate behind front angles (figs. 10, 12, 13) 18
- Clypeus bidentate or not at all dentate, side margins either straight or vaguely sinuate, or bent inward 23
18. Marginal hairs of elytra very long (at least as long as scutellum) 19
- Marginal hairs very short or of medium length (not longer at middle than width of one sutural interval) 21
19. Sinuation of sides of clypeus weak; front of head and the labrum flattened, not truly concave; front margin of clypeus usually scarcely emarginate; Mexico; southwestern United States
- *angularis* in part
- Sinuation of sides of clypeus strong (forming a blunt tooth in *denticeps*); front of head usually deeply and the labrum shallowly concave; front margin of clypeus usually strongly emarginate, even V-shaped; not in the United States except one specimen from southern Texas 20
20. Tawny, head only occasionally dark; usually 8 to 9.5 mm.; V emargination of clypeus shallow; front of head deeply concave; pronotum transverse, short; Texas; Chihuahua and other parts of Mexico *denticeps*
- Dark red or black, head usually black; usually 6 to 8 mm.; V emargination of clypeus deep (fig. 10); front of head less often concave; pronotum long, appearing less transverse; Chihuahua . . . *fissilis*
- 21(18). Front of head with slight frown behind clypeus; marginal hairs of elytra scarcely visible (worn?); each eye nearly one-third of width of head; males with very hairy tarsal pads; male genitalia as in figures 127 and 160; Guerrero
- *hirtipes*
- Front of head flattened or rounded, but without frown or ridge; marginal hairs of elytra as long as width of one sutural interval; males without hairy pads on tarsi; male genitalia as in figures 128 and 153 22
22. Dark or light red; clypeus very broad (fig. 13), its angles rather blunt; pronotum with sides gently, evenly arcuate from base to apex; states of Mexico and Michoacan west to Colima
- *cribraticollis*
- Dark red, with head and all of center usually darkened or black; clypeus much narrower than in *cribraticollis* (fig. 12); pronotum with sides strongly bulging near base; states of Mexico and Michoacan *mediafusca*
- 23(17). Marginal hairs of elytra short (scarcely, if at all, longer than width of a sutural interval)¹ 24
- Marginal hairs of elytra long (as long as scutellum) 37
24. Front tibiae bidentate (third tooth may be present as slight swelling); hind femora (lower edge) bulbous and noticeably sinuate before apex; pygidium sparsely punctured; spiracle on sides of fifth abdominal segment very prominent; tarsal claws scarcely bent, very shallowly cleft at apex (figs. 21, 22); southwestern Mexico; Guatemala; El Salvador
- *macrotarsus*
- Not exactly as above 25
25. Occurring in Sonora and northern Sinaloa, northwestern Mexico; front tibiae (fig. 23) with large apical and subapical teeth, and third (basal) tooth situated at middle of tibiae *sonora*
- Occurring south of the above states or in Durango to the east; front tibiae (except in *cribriceps*) with third tooth in front of middle (fig. 24 of *conca*) and other teeth smaller 26
26. Front margin of pronotum at sides drawn forward to acute angle 27
- Front margin of pronotum at sides truncate or virtually so, forming obtuse or right angle 28
27. Pronotum with sides strongly arcuate behind middle and hind angles rounded off without angulation; side margins of clypeus (fig. 31) almost parallel to front after abrupt indentation in front of eye; front of head not concave; Guerrero; Puebla *incisa*
- Pronotum with sides scarcely arcuate and hind angles distinctly angulate; side margins of clypeus converging obliquely to front without indentation in front of eye; front of head concave; Durango; Hidalgo (?) *saltensis* in part
28. Eyes very large, each eye one-third or nearly one-third of width of head; size small (6 to 7 mm.) 29
- Eyes not quite so large, each eye one-fifth

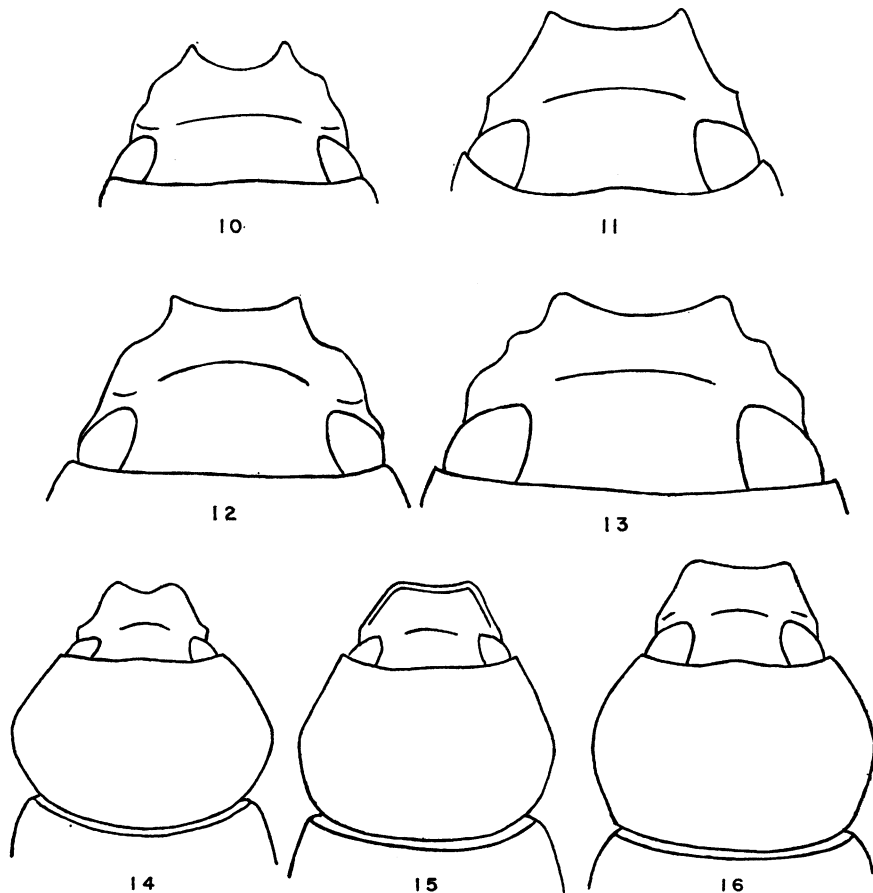
¹ It must be remembered that these hairs can become worn; therefore more than one specimen should be examined.

- or one-fourth of width of head; size usually larger than 7 mm. (but as small in *parvula* and some individuals of *tepicana*)30
29. Front of head convex and with slight frown over clypeus; clypeus about one-half of length of head; pronotum only one-third of length of elytra; southern and central Mexico *roberti*
Front of head broadly concave; clypeus shelf-like, almost as long as head (fig. 25); pronotum as long as one-half of length of elytra; northwestern coast of Mexico (only two males examined) *pala*
30. Clypeus angularly indented in front of eyes, its side margins almost parallel; 9 to 10 mm.; Pacific coast from Chiapas, Mexico, south to Honduras . . . *ohausti*¹
Clypeus not indented in front of eyes, sides distinctly oblique; north of Chiapas, Mexico31
31. Male genitalia as in figures 118 and 152; pronotum very large, widened behind, sides of base near hind angles tumid and impunctate, area within hind angles vaguely impressed, and front margin of clypeus usually distinctly V-shaped and emarginate; Guerrero; Michoacan; Puebla *tumida*
Male genitalia otherwise; pronotum not as described above, and front margin of clypeus usually either slightly emarginate or virtually truncate32
32. Pronotum very convex and humped (sides strongly arcuate and strongly cut back to base) and very coarsely, densely punctured as on elytra, the latter almost as wide at middle as long; southern Mexico north to Colima *cribriceps* in part
Pronotum not both very convex and coarsely punctured; if doubtful, then elytra distinctly elongate33
33. Dorsum entirely finely and densely punctured; second interval of elytra distinctly multipunctate in two and three rows; reflexed elytral margin, from middle to apex, as wide as outer interval of elytra; female with spurs on hind tibiae as wide as first tarsal segment at base (fig. 26); Progreso, state of Morelos *latispina*
Disc of pronotum and/or head sparsely punctured; second interval of elytra unipunctate (but with two rows in *consentanea* and some specimens of *tepicana*); reflexed elytral margin no wider than margin itself; female with spurs of hind tibiae normal34
34. Male genitalia as in figures 126 and 161; Durango; Hidalgo (?) *saltensis* in part
Male genitalia not as in above figures; not known from Durango35
35. Head sparsely, irregularly punctured; second interval (fig. 1) of elytra unipunctate; suture of elytra usually crowded with punctures; pronotum strongly angulate from behind middle to rounded-off hind corners; 5.5 to 6.5 mm.; Oaxaca *parvula*
Head densely punctured; second interval of elytra usually with double row of punctures; suture of elytra with one row of punctures; pronotum usually only gently arcuate from behind middle to rather angulate hind corners; 6 to 8.5 mm.; Oaxaca and other states of Mexico36
36. Elytra proportionately longer (three times length of pronotum); color usually tawny; clypeus usually tumid at center near suture, suture usually sinuate; male genitalia as in figure 132; Jalisco, Aguascalientes, and other states southward but not Nayarit . . . *consentanea*
Elytra proportionately shorter (two and one-half times length of pronotum); color black, or black and dark red, seldom tawny; clypeus usually flat, its suture usually straight; male genitalia as in figure 116; Nayarit . . . *tepicana*
- 37(23). Clypeus as long as head, the entire front half reflexed and concave (fig. 16); length, 9.5 to 11 mm.; front tibiae curved and angulate on inner side (fig. 24); sides of pronotum evenly arcuate from base to apex; Guerrero (only five specimens examined) *concava*
Characters not exactly as given above .38
38. Elytral costae virtually impunctate or with only six or seven punctures . . .39
Elytral costae with at least eight, usually many more, punctures41
39. Front of head with frown behind clypeus (a slightly transverse convexity or impunctate area); eyes somewhat sunk below level of head and clypeus; front angles of pronotum acute; Oaxaca *rufipes*
Front of head flat or depressed; eyes not

¹ This species is treated in part 1 (Vaurie, 1958) with *zeteki* (*ohausti* group) but is included in the present key because clypeal hairs are visible on some specimens.

- depressed; front angles of pronotum right or obtuse; Guerrero north to Chihuahua 40
40. Clypeus more or less rounded in front (fig. 36); labrum large (longer than reflexed under side of clypeus); pygidium sparsely punctured; Pacific coast of Mexico from Sinaloa to Guerrero *sparsa* in part
- Clypeus bi-angulate, vaguely dentiform; labrum small (no longer than reflexed under side of clypeus); pygidium densely punctured; Chihuahua, Sonora (two specimens only) *dissona*
- 41(38). Pronotum very convex, sparsely, shallowly punctured, nearly one-half of length of elytra; eyes no more than one-fifth of width of head; clypeus bi-angulate (fig. 51); color tawny; length, 5.5 to 6 mm.; Durango (five specimens only) *durango*
- All characters not as above 42
42. Front of head slightly tumid either behind clypeus, or at center in the form of a pimple of concentrated punctures, and clypeus nearly as long as head (fig. 14); Mexico; Guatemala; El Salvador *angustula* in part
- Front of head flattened or concave, not tumid; clypeus variable in length . 43
43. Species occurring in the United States . 44
- Species not occurring in the United States 45
44. Clypeus narrowing in front, with dentiform angles, the sides usually sinuate behind the angles, punctures of clypeus larger than those on head; punctures of head usually sparser at center behind clypeus; male genitalia as in figure 120; Arizona, New Mexico, western Texas *angularis* in part
- Clypeus broad in front, bi-angulate but not usually dentiform, sides with scarcely any sinuation, punctures of head and clypeus uniform and of about the same size and density; male genitalia as in figure 128; southern Arizona *chiricahuae* in part
45. Front of head with a few long hairs; second interval and all other intervals of elytra crowded with small punctures, even at base of sutural interval; male genitalia as in figure 131; Veracruz, Puebla, Oaxaca; also Guatemala *bicolor* in part
- Front of head without hairs; punctuation of elytra variable 46
46. Male genitalia with lateral lobes (parameres) joined on inner margin at middle or basal third 47
- Male genitalia with lateral lobes joined on inner margin at basal fifth or basal fourth 51
47. Clypeus with sides in front broadly, evenly rounded off (fig. 15); male genitalia as in figures 122 and 133 . 48
- Clypeus with sides in front either dentiform (teeth may be blunt), or forming a sharp angle (teeth may be worn, so genitalia should be consulted); male genitalia as in figures 115, 116, and 120 49
48. Pronotum with sides rounded off at base in unbroken curve, punctures of disc uniformly fine and dense; male with long coarse hairs on first tarsal segments; female with sixth abdominal segment concealed (if exposed, is glabrous); Oaxaca *tehuana*
- Pronotum with sides at base forming distinct obtuse angle, punctures of disc irregularly sparse; male with tarsal hairs normal; female with short sixth abdominal segment exerted, punctured, and hairy; Chiapas *crucis*
49. Elytra apparently scarcely more than twice longer than pronotum; head and clypeus usually uniformly, densely punctured; head not concave; clypeus usually truncate, angles not or but narrowly dentiform; male genitalia as in figure 116; Michoacan, Morelos, and Veracruz in Mexico south to Costa Rica *demigrata*
- Elytra more than twice longer than pronotum; head usually with smaller, finer punctures than clypeus and either concave or with impunctate space in front; clypeus usually emarginate, often with broadly dentiform angles 50
50. Color usually tawny; size smaller, narrower; clypeus shorter, more narrow in front; male genitalia as in figure 120; most of Mexico except extreme northeast, north of San Luis Potosi *angularis* in part
- Color usually dark red; size larger, broader; clypeus longer (often nearly as long as head); male genitalia as in figure 115; range as in *angularis* above but continuing into Central America *trapezifera*
- 51(46). Pygidium sparsely punctured 52
- Pygidium densely punctured 53
52. Pacific coast of Mexico from Sinaloa to Guerrero including Tres Marias archi-

- pelago; male genitalia as in figure 128; front tibiae with third tooth median; clypeus usually more or less rounded from side to side (fig. 36) *sparsa* in part Yucatan and Chiapas southward to Costa Rica; male genitalia as in figure 132; front tibiae with third tooth in front of middle; clypeus usually obtusely angulate on sides in front *yucateca*
53. Clypeus with front and side margins about equally emarginate (fig. 11), or clypeus with dentiform or sharp front angles; front of head shallowly or deeply concave 54
- Clypeus either with all margins nearly straight or, if front margin is emarginate, then front angles broadly rounded, not dentiform or sharp; front of head usually flat 55
54. Reflexed elytral margin next to first two abdominal segments usually as wide as outermost interval of elytra; male genitalia large and stout (Fig. 124); northwestern to southern Mexico *megapleura*
- Reflexed elytral margin next to first two abdominal segments usually only the width of the margin; male genitalia small, slight (fig. 131); central and southern Mexico; Guatemala *bicolor* in part
55. Pronotum with side and basal margins forming a continuous curve, the hind angles rounded off (fig. 14); disc of pronotum sparsely punctured in contrast to dense punctuation of head and clypeus; male genitalia as in figure 121; Colima and Veracruz south to El Salvador *angustula* in part



FIGS. 10-16. Heads and clypei and three pronota of *Diplotaxis* of *trapezifera* group. (Pronota at a smaller scale.) 10. *D. fissilis*. 11. *D. megapleura* (type). 12. *D. mediafusca* (type). 13. *D. cribraticollis*; characteristic also of *D. zapoteca* (*puberea* group). 14. *D. angustula*. 15. *D. tehuana* (type). 16. *D. concava*.

Pronotum with hind angles obtuse but distinct; disc of pronotum about as densely punctured as head and clypeus 56

56. Chihuahua, Durango, and Sonora in Mexico; front margin of clypeus only weakly reflexed; first segment of hind tarsi almost as long as second; elytra with tiny dorsal hairs on sides and apex (not always visible); male genitalia as in figure 128 *chiricahuae* in part Sinaloa, Mexico; front margin of clypeus prominently reflexed; first segment of hind tarsi (male only) about one-half of length of second; elytra without dorsal hairs; male genitalia as in figure 134; (two specimens seen) *nigriventris*

SECTION 1 OF SPECIES GROUP *trapezifera*

The majority of species are placed in this section of the group. Each species is compared with the first one, *denticeps*. Many of these species are so similar that it is virtually impossible to construct a logical linear sequence. The order of the species is given at the beginning of the group.

Diplotaxis denticeps Bates

Figures 117, 154

Diplotaxis trapezifera var. 2 *D. denticeps* BATES, 1887 (1887-1888), p. 159 (type not designated; lectotype, male, Toluca, Mexico state, Mexico, here designated from part of original series in the British Museum).

RANGE: Various states of Mexico from Oaxaca in the south northward to Durango and Chihuahua, and in the United States only in southern Texas. About 2800 specimens have been examined (see Appendix for locality data).

HABITAT: Three specimens were collected in Mexico City by William W. Gibson in March inside a house, which is the first such ecological niche reported for species of this genus.

DIAGNOSIS AND DESCRIPTION OF LECTOTYPE, MALE: (See also characters of group). Marginal hairs of elytra long (sparse in lectotype); second interval of elytra multipunctate; pronotum with sides gently arcuate, front angles right, hind angles obtuse; front of head concave.

Length, 9 mm. Color, tawny. Head in profile almost perpendicular to clypeus, with

flattened concavity at middle, finely, rather densely punctured. Clypeal suture obliterated at middle. Clypeus hairy, as long as flat area on head (i.e., more than one-half of the length of head), more or less quadridentate, front margin emarginate and strongly reflexed between acute dentiform angles, sides strongly sinuate near front, almost dentate, punctures larger and denser than those on head. Eyes not sunk, each eye about one-fifth of the width of head. Maxillary palpi with last segment not impressed at base (is impressed in most other specimens). Labrum slightly concave, shorter than reflexed under side of clypeus, densely, strongly punctured. Mentum virtually flat, a faint pubescent ridge indicating the anterior declivity in apical third.

Pronotum rather flat, punctures of disc as fine and dense as those on head, sides widest at about middle. Elytra about three times longer than pronotum, punctures larger and denser than on pronotum; costae, especially suture and first inner costae, distinctly elevated, convex; marginal hairs as long as scutellum. Metasternum slightly depressed at middle.¹ Pygidium densely punctured.

Front tibiae with third or basal tooth only slightly in front of middle. Hind femora and tibiae narrow. Middle tarsi with first two segments equal in length, hind tarsi with first segment one-half of length of second, hind tarsi longer than hind tibiae by length of claw segment. Genitalia as in figures 117 and 154.²

SEXUAL DIMORPHISM: The lectotype (male) and other males have the pygidium somewhat more transverse and retracted than females, the hind tarsi a little longer, the hind femora narrower, and the hind tibiae usually less strongly carinate on the sides and less flared out apically. The longer of the hind tibial spurs is longer than the first tarsal segment in both sexes, and equally narrow in both.

VARIATIONS FROM LECTOTYPE: The length varies from 7 to 9.5 mm. In most specimens

¹ In other specimens the metasternum is about one and one-half times longer than the width of the hind femora, but its length was not noted for the lectotype.

² In other specimens the basal piece of the male genitalia is one-fourth shorter than the lobes, but its length was not noted for the lectotype.

the eyes are only one-quarter of the width of the head, the palpi are impressed or at least flattened at base; and the second set of blunt "teeth" on the sides of the clypeus in front vary in degree of prominence. The marginal hairs of the elytra are denser in some individuals and usually are as long as the width of the scutellum. The sides of the pronotum may be widest behind the middle. Some specimens have dark heads and the front of the head more deeply excavated, and the area around the hind angles of the pronotum rather convex and impunctate.

REMARKS: Comparison of this species with the two other large species that have the clypeus virtually quadridentate is made under those species (*cribraticollis*, *mediafusca*). This species is perhaps more similar to *angularis* LeConte than it is to these others (even though *angularis* seldom qualifies for the term "quadridentate clypeus"), and it occurs in most of the same states of Mexico as *angularis*. Before I had discovered the importance of the genitalia of the males in this group of beetles, I had considered typical *angularis* and typical *denticeps* as extreme variations of the same species. In series, however, *denticeps* is seen to be a larger species, and it differs from *angularis* in the male genitalia as well as in the shape and length of the pronotum, in the concave head, and the quadridentate clypeus. However, the head is only slightly depressed in some individuals, so that these would resemble some specimens of *angularis*; the strong sinuations on the side margins of the clypeus are not so prominent in some individuals, which would therefore resemble those individuals of *angularis* that have the sinuations a little stronger than usual. These variations do not extend to the genitalia of these species which are of an entirely different type, those of *denticeps* being the "pincer" type with the lobes curved inward to the base and apex (fig. 117), and joined at the middle, whereas the lobes of *angularis* are nearly straight and contiguous, and joined behind the middle (fig. 120).

The male genitalia of *trapezifera* are also quite different from those of *denticeps*, although Bates (1887-1888, p. 159) considered *denticeps* a variety and found all gradations among his varieties of *trapezifera* between the "simple outline [of the clypeus] and a form

in which the sides are angularly flexuous." The latter form, *denticeps*, he compared with *Liogenys quadridens* Fabricius, which, as he states, differs by having a long sharp tooth on the side margins of the clypeus, not merely a "dentiform dilatation" as in *denticeps*. (See *trapezifera* for discussion of "varieties.")

Dalla Torre (1912, p. 149) mistakenly lists this species as "var. *dentipes* Bates."

A much smaller species which has the genitalia almost exactly the same as those of *denticeps* is *fissilis* Vaurie and Cazier from northwestern Mexico, and this species has also a quite similar clypeus (see *fissilis*).

***Diplotaxis fissilis* Vaurie and Cazier**

Figures 10, 117, 154

Diplotaxis fissilis VAURIE AND CAZIER, 1955, p. 23, figs. 2C, 3C (Santa Barbara, Chihuahua, Mexico; type, male, in the American Museum of Natural History).

RANGE: Chihuahua and Zacatecas in northwestern Mexico. From Santa Barbara and vicinity, Chihuahua, I have examined 281 specimens, including the type and paratypes; and from Sombrerete, Zacatecas, 24 paratypes.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra long; second interval of elytra multipunctate; pronotum with sides arcuate at middle, angles obtuse; head flat or concave.

Length, 5.5 to 8 mm. Color dark red, with head usually black, or entirely black. Head as in *denticeps*. Clypeus hairy, one-half of the length of head or as long as head, more or less quadridentate, punctures larger than those on head, front margin strongly emarginate (V-shaped) and reflexed between acute dentiform angles, sides strongly sinuate near front, almost forming a blunt tooth (fig. 10). Eyes, labrum, and mentum as in *denticeps*.

Pronotum convex, punctures of disc fine and dense, about as on head, in many specimens with a short impunctate space at center. Elytra, metasternum, and pygidium as in *denticeps*.

Front tibiae, hind femora, middle and hind tarsi, and genitalia as in *denticeps* (figs. 117, 154).

SEXUAL DIMORPHISM: As in *denticeps*.

REMARKS: In view of the above description

one might well wonder how this species can be maintained as distinct from *denticeps*. I have very large series of both species, however, and certain differences can be observed. First, of the 2200 specimens of *denticeps* examined from the state of Chihuahua, no specimens were collected in Santa Barbara where *fissilis* is common. Furthermore, I have not seen any *denticeps* with the dark, almost black color of *fissilis* although a small percentage of *fissilis* are tawny colored; *fissilis* is not only a darker, but also a smaller species (5.5 to 8 mm.; *denticeps* is 7 to 9.5 mm.). The clypeus of *fissilis* is more deeply split and has longer, more acute, front angles than in *denticeps*; the head in some specimens is concave as in *denticeps*, but in most specimens it is only vaguely flattened; the sides of the clypeus do not have such a strong sinuation in front; the pronotum is proportionately longer, less transverse, in *fissilis*, more convex, and without the rather convex impunctate area on the border in the vicinity of the hind angles that is characteristic of most specimens of *denticeps*. The tibiae are somewhat stouter in *fissilis*.

***Diplotaxis angularis* Le Conte**

Figures 120, 151

Diplotaxis angularis LECONTE, 1856, p. 268 ("Copper Mines of the Gila" [Gila River, southern Arizona]; two cotypes, males, in the Museum of Comparative Zoölogy).

Diplotaxis producta FALL, 1932, p. 195 (Alpine [Brewster County], Texas; type, female, in the Museum of Comparative Zoölogy). New synonymy.

RANGE: Most of Mexico (with the exception of the northeast and of Sonora in the northwest) from Oaxaca in the south through Durango and Chihuahua in the north, and San Luis Potosi, into the United States in Arizona, New Mexico, western Texas, and central Oklahoma (one specimen). About 5000 specimens have been examined (see Appendix for further data).

HABITAT: A series of 24 specimens from Zimapan, Hidalgo, and of 18 from Tehuacan, Puebla, were collected by P. D. Hurd, Jr., in June, 1951, "on flowers of *Eysenhardtia polystachya* (Ortega)," a shrub or tree with aromatic foliage. A specimen of *angularis* from San Juan del Rio, Durango, was taken

on the shrub *Baccharis glutinosa*. Five individuals recently emerged from the pupal state were dug from loose soil beneath Huizache (*Mimosa* sp.) in May, 1957, by William W. Gibson and Philippe Barker.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra long; second interval of elytra either multipunctate throughout or irregularly unpunctate in front; pronotum with sides strongly arcuate, angles obtuse; head without frown.

Length, 6.5 to 8 mm. Color tawny. Head as in *denticeps* except that the front is not concave, but may be flattened. Clypeus hairy, about one-half of the length of head, punctures the same as those on head or slightly larger, front margin shallowly if at all emarginate and broadly reflexed between acute dentiform angles (angles blunt in some specimens), sides also reflexed, slightly sinuate. Eyes not sunk, each eye one-quarter or one-fifth of the width of head. Labrum flat, densely punctured, level with and the same length as the reflexed under side of clypeus. Mentum as in *denticeps*.

Pronotum as in *denticeps* except that generally the sides are widest behind middle. Elytra three times longer than pronotum, punctures larger and in most specimens sparser than those on pronotum; costae flat or convex; marginal hairs as long as scutellum. Metasternum and pygidium as in *denticeps*.

Front tibiae and all tarsi as in *denticeps*. Male genitalia as in figures 120 and 151; basal piece one-third shorter than lobes.

SEXUAL DIMORPHISM: As in *denticeps*.

REMARKS: It can be seen from the above description that this species has many similarities with *denticeps* (see *denticeps* for further comparisons).

This species and the tiny *aenea* Blanchard have been taken in more states of Mexico than any other species (16 and 15 states, respectively). Although the type locality of *angularis* is in Arizona, I have seen only about 50 specimens from the United States, and of these about half comprise a single series from Marathon, Texas. The only common tawny species of the *trapezifera* group in Arizona is *chiricahuae* Fall, which can readily be confused with *angularis* but which differs by having a very different type of male genitalia

(figs. 128, 159), the clypeus bi-angulate in front but not distinctly bidentate, broader in front than in *angularis*, the sides of the clypeus less sinuate, the punctures of the head not smaller or finer than those of the clypeus, and tiny hairs visible on the elytra, especially on the sides apically. Actually these differences, except those connected with the genitalia, are neither very striking nor very constant. The two species occur together in both Arizona, where *angularis* is much less common, and Chihuahua and Durango, Mexico, where *chiricahuae* is less common.

The description of *angularis* reads almost the same as that of *trapezifera* Bates. Although these species appear to be different and have different male genitalia, not much can be said to show the differences. In general *angularis* is a narrower, more elongate, species, smaller, lighter in color than *trapezifera*, the clypeus is not so long, more narrow in front, and has small acute dentiform angles (occasional male specimens of *trapezifera* also have dentiform angles, but the angles are usually merely obtusely angulate). These species occur together in many of the states of Mexico (Durango, Jalisco, Colima, Guerrero, Morelos, San Luis Potosi, and Oaxaca).

In some of the same localities there occurs also *megapleura*, a species that differs notably from *angularis* in the male genitalia, but not so much externally. In general it has the front of the head concave, not convex or merely flattened as in *angularis*, the pronotum larger and with the sides more cut back at base, the hind angles more rounded off, the front angles sharper, and the clypeus longer.

The only difference I was able to find between the type of *producta* (Alpine, Texas) and that of *angularis* (Gila River, Arizona) is that the former has only the apical part of the second elytral interval multipunctate, whereas the latter has the entire second interval multipunctate. Specimens from various localities in Mexico, however, show this same variation, and it is a common variation in a number of the species of the group. The punctures of the second interval in this species, however, are never distinctly unipunctate throughout, as they are in some other species.

Diplotaxis chiricahuae Fall

Figures 128, 159

Diplotaxis chiricahuae FALL, 1909, p. 86 (Chiricahua Mountains, Cochise County, Arizona; type, female, in the Museum of Comparative Zoölogy).

RANGE: Southern Arizona, and the states of Sonora, Chihuahua, and Durango in northwestern Mexico. About 400 specimens have been examined, 77 of these from Mexico. (See Appendix for locality data.)

HABITAT: A male from Chihuahua, Chihuahua, Mexico, was collected in August of 1951 by P. D. Hurd, Jr., on "*Baccharis*."

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra long; second interval of elytra irregularly unipunctate or multipunctate; pronotum with sides strongly arcuate, front angles right, hind angles obtuse; head flat or slightly impressed.

Length, 6.5 to 8 mm. Color tawny, often with scattered black infuscations. Head descending obliquely to clypeus, very densely, evenly punctured, flat in front or slightly impressed, but often with a line or apparent convexity behind clypeus. Clypeus hairy, as long as one-half of the length of head, front margin truncate or very slightly emarginate, and only weakly reflexed between bluntly obtuse or indistinctly dentate angles (in a few specimens, angles acute); sides slightly reflexed and sinuate, punctures the same as those on head, in a few specimens slightly larger. Eyes not sunk, large, each eye one-quarter to one-fifth of the width of head. Labrum flat in front, densely, strongly punctured, slightly longer than and level with the reflexed under side of clypeus. Mentum as in *denticeps*.

Pronotum rather flat, punctures of same size as those on head, on disc sparser than those on head, but on sides dense, sides widest behind middle, rather strongly constricted to the hind angles and in some specimens slightly sinuate before these angles. Elytra with tiny hairs visible on the outer rows, in some specimens hairs as long as the shortest of the marginal hairs, elytra about three times longer than pronotum, punctures in most specimens larger and sparser than those on pronotum, costae flat; marginal hairs not

quite so long as scutellum. Metasternum and pygidium as in *denticeps*.

Front tibiae, hind femora, and tarsi as in *denticeps* except that the hind tarsi are not so long and have the first segment only slightly shorter than second, not one-half as short. Genitalia as in figures 128 and 159, basal piece slightly shorter than lobes.

SEXUAL DIMORPHISM: As in *denticeps*.

REMARKS: Excluding the six species from Baja California, this is the only one of the species that so closely resemble one another (*megapleura*, *angularis*, *trapezifera*, *denticeps*, *denigrata*, and *bicolor*) that has dorsal elytral hairs long enough to be seen, although some specimens of *angularis* have tiny hairs. It is the only species of the group occurring commonly in the United States (Arizona), although *denticeps* has been taken in southern Texas (one specimen only), and *angularis* occurs sparingly in Arizona and New Mexico. In Mexico (see Appendix) *chiricahuae* is evidently less abundant than in the north.

The broad clypeus with nearly straight sides, the uniformly punctured head, and the dorsal hairs are occasionally sufficiently diagnostic to distinguish this species from *angularis*, *megapleura* (see those species for further comparisons), and *denticeps* (clypeus quadridentate), but at other times dissection may be required. For strictly identification purposes, *chiricahuae* need not be separated from *denigrata* or *bicolor* or *cribraticollis*, because these species do not occur so far north. A few specimens of the more southern *trapezifera* have been seen from the states of Durango and Sinaloa, however, and these differ from the few specimens of *chiricahuae* from Durango (Entronque, San Juan del Rio, and Pedricena) principally in the male genitalia, which have the lobes short and joined near the base in *chiricahuae* (fig. 128), but elongate and joined at the middle in *trapezifera* (fig. 115). External morphological characters differ only slightly, the *chiricahuae* specimens having the head and clypeus equally densely and uniformly punctured, whereas the *trapezifera* population of Nombre de Dios, Durango, has the punctures of the head rather more sparse and smaller than those of the clypeus. The *chiricahuae* specimens from Sonora are rather darker than the majority. The male genitalia of *chiricahuae*

differ distinctly from those of all the above species except *megapleura* and *cribraticollis*.

Other similar species of the group occurring in Chihuahua or Durango and that might possibly occur in the United States (*catarinas*, *superflua*, *saltensis*, and *consentanea*) have the hairs on the margins of the elytra short, not long as in *chiricahuae* and the other species discussed above.

***Diplotaxis mediafusca* Vaurie, new species**

Figures 12, 119, 153

TYPE MATERIAL: Type, male, 25 kilometers east of Morelia, Michoacan, Mexico, "at light," June 14, 1955, R. B. and J. M. Selander, collectors, and 25 male paratopotypes deposited in the American Museum of Natural History.

RANGE: From Michoacan eastward to the area around Mexico City. In addition to the paratypes, 50 specimens have been examined with the same data as the type, 10 have been examined from Real de Arriba, Temascaltepec, in the state of Mexico, and three from Temascaltepec. Two specimens from "Chiapas, Mexico" are probably wrongly labeled.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short to medium; second interval of elytra multipunctate; pronotal sides strongly arcuate and bulging behind middle; front angles right, hind angles obtuse; head without frown.

Length, 9 mm. Color dark red, with front margin of clypeus, head, and center of pronotum and elytra black. Head in profile descending gently to clypeal suture which is obliterated at middle, front of head flattened, punctures fine, dense. Clypeus sparsely hairy, about one-half of the length of head, more or less quadridentate, the front third strongly reflexed and nearly truncate between acute dentiform angles, sides less reflexed, but so strongly sinuate at middle as to make clypeus appear quadridentate, punctures about the same as those on head. Eyes not sunk, large, each eye about one-quarter of the width of head. Palpi with impression on last segment at base. Labrum flat in front, level with, and definitely shorter than, reflexed under side of clypeus, slightly concave behind, densely punctured. Mentum as in *denticeps*.

Pronotum as in *denticeps* except that the sides are more bulging and have their widest part nearly at base, punctures of disc sparser than those on head. Elytra about three times longer than pronotum, punctures slightly larger but not denser than those on pronotum; costae weakly convex; some of the marginal hairs longer than a sutural interval is wide. Metasternum as in *denticeps*. Pygidium not large; densely, rugosely punctured.

Front tibiae and middle and hind tarsi as in *denticeps*. Genitalia as in figures 119 and 153, basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *denticeps*.

VARIATIONS FROM TYPE: The size of the species ranges from 7 to 9.5 mm. Some specimens have no black on the elytra or pronotum, but usually black is present on the head. The head in some individuals may be more abruptly declivous than in the type, the punctures of the clypeus may be larger than those on the head, and the front margin of the clypeus may be indented in front of the eye.

REMARKS: This species is very similar to the widespread *denticeps* Bates in its rather quadridentate clypeus (fig. 12), acute clypeal angles, mentum, and legs, but differs from it by being darker in color, usually with black infuscations on the head and down the middle of the dorsum, by having the front of the head flattened but not concave, the marginal hairs of the elytra and pronotum shorter, not so long as the scutellum is wide, the pronotum longer and wider, the sides more strongly arcuate and the arcuation more posterior, and the clypeus usually less emarginate in front and with less acute and distinct front angles. In addition the lateral lobes of the male genitalia (figs. 117, 119), although in most specimens overlapping at the apex in repose as in *denticeps*, differ from those of that species by being joined nearer the base, not at the middle, and by having the inner apices not angulate within. The sclerotized division of the lobes does not reach all the way to the base in either species.

A number of individual variations occur in both species. Thus a few specimens of *denticeps* have the head darkened as in *mediafusca*, or they have the frontal concavity less pronounced than usual and so resemble *mediafusca*. The genitalia, however, cannot be confused, nor the difference between the

species in the shape of the sides of the pronotum. (See *cribraticollis* for comparison with that species.)

***Diploptaxis hirtipes* Vaurie, new species**

Figures 127, 160

TYPE MATERIAL: Type, male, El Mogote, near Taxco, Guerrero, Mexico, 5000 feet, June 1, 1954, R. K. Selander, collector, and four male paratopotypes in the American Museum of Natural History.

RANGE: Known only from the type locality in south central Mexico. Two females with the same data as the paratopotypes have been examined.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra very short; second interval of elytra multipunctate; pronotum with sides strongly arcuate and bulging behind middle, front angles obtuse, hind angles rounded off; head with slight frown.

Length, 7.5 mm. Color dark red. Head gently sloping to clypeus, front with slight frown behind clypeus, finely, densely punctured. Clypeal suture obliterated at middle. Clypeus sparsely hairy, scarcely one-half of the length of head, front margin reflexed and slightly emarginate between acute dentiform angles; sides outwardly sinuate and converging obliquely to front, punctures rugose, twice as large as those on head. Eyes not sunk, large, each eye one-quarter (nearly one-third) of the width of head. Palpi with last segment not impressed at base. Labrum flat, finely, densely punctured, same length as reflexed under side of clypeus. Mentum as in *denticeps*.

Pronotum convex, punctures of disc as fine and dense as those on head except for a short, median, impunctate space, sides widest behind middle and continuous with base, virtually without any hind angles, base with short, transverse, impunctate area. Elytra as in *denticeps* except that costae are flat and scarcely differentiated from the other intervals, and hairs of margin are just visible. Metasternum twice as long as width of hind femora. Pygidium with large, rather dense, and irregular punctures.

Front tibiae with third tooth distinctly in front of middle. Hind femora narrow, not bulging. Hind tarsi with first segment shorter

than second by about one-third (middle tarsi lacking), hind tarsi slightly longer than hind tibiae. Genitalia as in figures 127 and 160, basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: As in *denticeps*, with the addition that the tarsi of the type and other males have very long hairs which are sufficiently thick on the first three segments to form hairy pads; also males have larger front tarsi than females.

VARIATIONS FROM TYPE: The length ranges from 7 to 8.5 mm. The head in some specimens is very convex and descends rather abruptly to the clypeus; the rounded-off hind angles of the pronotum show a slight obtuse angulation in some specimens; the longitudinal impunctate space of the pronotum varies in extent. In some specimens the costae of the elytra are elevated or convex.

REMARKS: The rather strong outward sinuation of the sides of the clypeus makes this species resemble those species with the clypeus virtually quadridentate (*denticeps*, *mediafusca*, and *cribraticollis*), but those species, as well as *angularis* LeConte, which often has the clypeal sides sinuate, have long, not minute marginal hairs on the elytra and no frown or ledge on the front of the head. The males of those species have no hairy pads on the tarsi as in *hirtipes* and their genitalia differ in shape. I have examined a male (dissected) and a female of *angularis* that were taken at the same time and place as *hirtipes*. (See *roberti* for comparison with that species.)

The middle tarsi are lacking in the type and other males but are present in one of the females; in this latter specimen the first two segments are about equal in length. None of the specimens is in perfect condition.

The male genitalia (fig. 127) seem quite short; the lobes are wide at the base, then taper to the apex.

***Diplotaxis cribraticollis* Blanchard**

Figures 13, 32, 128

Diplotaxis [sic] *cribraticollis* BLANCHARD, 1850, p. 171 (type locality, "Mexique," here restricted to the state of Michoacan in southern Mexico; type not found in Muséum National d'Histoire Naturelle, Paris).

RANGE: From Mexico City and Guerrero west and north to Colima and Jalisco (fig. 32). About 160 specimens have been examined. (See Appendix for further data.)

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra short to medium; second interval of elytra multipunctate; pronotum with sides gently to strongly arcuate, angles obtuse; head without frown.

Length, 7.5 to 10.5 mm. Color dark red. Head rounded or slightly flattened to clypeus, densely punctured. Clypeus hairy, one-half of the length of head (in a few specimens more than one-half), very broad in front, front margin shallowly if at all emarginate between blunt dentiform angles; sides strongly sinuate in front, so that clypeus appears nearly quadridentate, punctures a little larger than those on head (fig. 13). Eyes not sunk, each eye from one-fourth to one-fifth of the width of head. Labrum flat, level with, and the same length as the reflexed under side of clypeus, densely punctured. Mentum with declivity in apical fourth or fifth posteriorly margined and pubescent.

Pronotum with punctures on disc sparser than those on head, widest part behind middle, the sides in most specimens with a very slight sinuation just in front of hind angles; base depressed and with a row of large punctures across it. Elytra and metasternum as in *denticeps* except that marginal hairs of elytra are seldom longer than the width of a sutural interval. Pygidium sparsely or densely punctured.

Front tibiae as in *denticeps*. Hind femora not bulbous. Middle and hind tarsi as in *denticeps*. Genitalia as in figure 128 of *chirichuahae*, but basal piece about same length as lobes.

SEXUAL DIMORPHISM: As in *denticeps*.

REMARKS: This species differs from the other two large species that have a more or less quadridentate clypeus (*denticeps*, *mediafusca*) by having the clypeus shorter and broader, the angles blunt, not acute, and the front margin between the angles one and one-half times wider than it is in the other species (see figs. 12, 13). The pronotum has the sides more regularly arcuate and the base usually distinctly impressed and punctate. The male genitalia of all three species differ (figs. 117, 119, 128).

This species is not tawny, as is *denticeps*, but dark red, as is *mediafusca*. It agrees with *mediafusca* and differs from *denticeps* in the short marginal hairs of the elytra, the flat, not

concave labrum, and the absence of a concavity on the head. Both *cribraticollis* and *mediafusca* occur at Temascaltepec, Mexico, and both have been collected together at light by the Selanders (R. B. and J. M., also R. K. Selander) on the same date at 25 kilometers east of Morelia, Michoacan, where more than 100 specimens of the former species were taken and about 70 of *mediafusca*.

The present whereabouts of the type, as well as of the other types of Blanchard's *Diplotaxis*, is not known; they were not found in the logical place for them, the Museum in Paris, where they were catalogued by Blanchard himself in 1850. I have identified our material from an old specimen from the Sallé collection, marked "topotype" and labeled *cribraticollis* "according to Sallé." This specimen agrees well enough with Blanchard's description, and the identification is the same as that employed for some of the "Biologia" specimens in the British Museum.

At the British Museum, there are also three specimens (examined by me) identified by Bates as this species which are not even in this group. One of these is *convexilabrum* Vaurie and Cazier from Guanajuato, and the others are large females that I cannot identify from Yolos and Tepansacualco [=Tepanzacoalco] in the state of Oaxaca. These are the only definite localities Bates gives (1887-1888, p. 158) for *cribraticollis*, although there are specimens also from Temascaltepec and "Mexico" at the British Museum.

***Diplotaxis trapezifera* Bates**

Figures 17, 115, 151

Diplotaxis trapezifera BATES, 1887 (1887-1888), p. 159, pl. 9, fig. 24 (type locality not designated; the type, male, is from Jalapa, Veracruz, Mexico, in the British Museum).

RANGE: From Sinaloa and Durango in the west, and San Luis Potosi in the east, south in Mexico to Yucatan, and to all of Central America except British Honduras and Panama (fig. 17). About 700 specimens have been examined. (See Appendix for locality data.)

HABITAT: Two males and one female were collected from "flowers of cotton" in Managua, Nicaragua, April 12, 1952, by F. Estrada.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra long; second interval of elytra multipunctate; pronotum with sides arcuate, angles obtuse; head without frown.

Length, 7.5 to 9.5 mm. Color dark red (occasionally tawny). Head descending steeply to clypeus, densely punctured, flat or slightly depressed in front. Clypeus hairy, longer than one-half of the length of head, or as long as head, front margin emarginate and strongly reflexed between bluntly obtuse or acutely dentiform angles, sides also reflexed but slightly if at all sinuate, punctures larger and denser than those on head. Eyes not sunk, each eye one-quarter to one-fifth of the width of head. Labrum flat in front, often with a

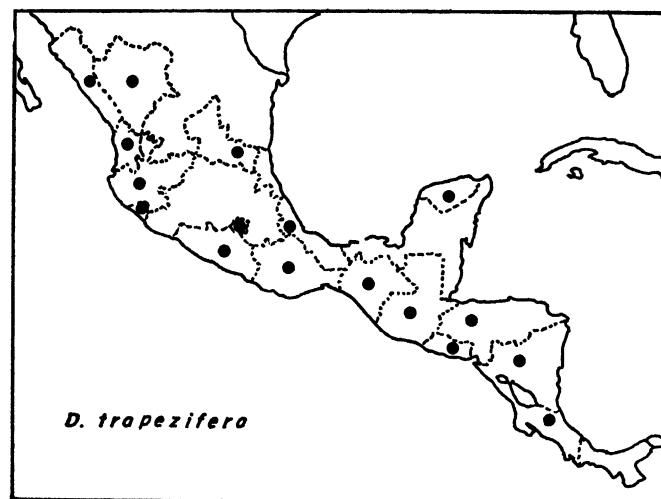


FIG. 17. Distribution of *Diplotaxis trapezifera*.

slight ridge on front edge and a depression or crease behind; densely punctured; about same length as or shorter than reflexed under side of clypeus, labrum sunk a little below the under side of clypeus. Mentum as in *denticeps*.

Pronotum convex, punctures on disc sparser than those on head but of same size, sides widest either at or behind middle. Elytra as in *denticeps*, except that costae are not always convex. Metasternum and pygidium as in *denticeps*.

Front tibiae and tarsi as in *denticeps*. Genitalia as in figures 115 and 151, basal piece nearly one-half of the length of lobes.

SEXUAL DIMORPHISM: As in *denticeps*, except that the pygidium of the male is not transverse but about equal-sided and very similar to that of the female.

REMARKS: The type of this species was dissected so that its identity with the present material could be established. It is strange that only four specimens (one dissected male, three females) other than the type have been seen from Veracruz (Jalapa), the type locality. This is one of the farthest-ranging species of the genus and is one of the five or six that extend as far south as Costa Rica.

When Bates described this species, he described also four varieties (*consentanea*, *denticeps*, *bicolor*, and *denigrata*) which I now consider as distinct species. These are distinguished principally on the basis of the male genitalia but also on other characters. Other characters (punctuation, the shape of the pronotum and clypeus, and the size of the eyes) may vary. The length of the marginal hairs, when the latter become worn, also may vary, so that isolated individuals, especially females, cannot be identified. However, the male genitalia are quite distinct in each of the species, with the exception of those of *trapezifera* and *denigrata* which differ only slightly (figs. 115, 116). The difficulty of identifying the species of this group without an examination of the genitalia is shown by the fact that there appear under the name *trapezifera* in the collection of the British Museum not only the four varieties of Bates, but eight other species, two of which are not even in the *trapezifera* group.

In his descriptions Bates generally does not specify which locality, of many, is that of his type; therefore the type localities of most of his species have been taken from the type

specimen itself. In the case of the "varieties" mentioned above, there are no types so labeled, but Bates's original series in the British Museum have the name of the varieties on a label in his writing. The specimens with the handwritten labels have been chosen as lectotypes except in the case of *consentanea*, for which the specimen labeled is from a locality (Omiteme, Guerrero) not mentioned by Bates until 1889 (p. 397), two years after his description appeared. In this instance a second specimen from the same series was chosen as lectotype.

This species can be confused with quite a few others. The male genitalia are nearly the same as those of *tepicana* Moser (Tepic), but that species is smaller and black and has short, not long, marginal hairs and a sparsely punctured pygidium. It occurs with *trapezifera* in Tepic and in the Tres Mariás Islands off the coast; in the latter locality, four *tepicana* occurred in a large series of about 155 *trapezifera* collected in May, 1925, by H. H. Keifer, and in this case the specimens of *tepicana* are tawny as are most of those of *trapezifera*.

The genitalia are very different from those of *bicolor*, a species that is otherwise very similar, with the same extremely long and very dense marginal hairs and, in some individuals, with the same clypeus and pronotum. Usually, however, *trapezifera* has the pronotal sides less arcuate than *bicolor*, and the elytra have larger, sparser punctures, those of the second interval arranged in one or two rows, not in three or four as in *bicolor*. These two species are sympatric in Mexico (Veracruz and Oaxaca) and in Guatemala.

In some other states of Mexico, also in northern Honduras, *trapezifera* is sympatric with *denigrata*. Comparison of individuals of both species in series taken by T. H. Hubbell at the Agricultural School at Zamorano, Honduras, at various dates in July, 1948, shows the following differences: Five females of *denigrata* have the clypeus trapezoid, virtually truncate in front, the sides not sinuate, the head and clypeus very densely and regularly punctured without break at the suture, the punctures of the clypeus scarcely larger than those on the head, the sides of the pronotum very strongly bulging behind the middle, the second elytral interval irregularly unipunctate, the punctures too small to fill the interval. Fifteen specimens of *trapezifera*, includ-

ing some males, have the clypeus emarginate and strongly reflexed in front, its sides rather sinuous; the head with sparser and much smaller punctures than the clypeus, the difference of punctuation evident at the suture; the pronotal sides arcuate but not bulging; the punctures of the second elytral interval, whether in single or double rows, filling most of the interval. The lobes of the male genitalia of *trapezifera* have constricted and narrowly acuminate apices (figs. 115, 116), whereas those of *denigrata* are more blunt and lack the constriction. (For comparison with *angularis*, see that species.)

Another species that may be mistaken for *trapezifera* is *megapleura* which occurs with *trapezifera* in the states of Sinaloa, Nayarit, Guerrero, Morelos, Oaxaca, and Chiapas. Typical individuals of this species have the eyes even larger than those of *trapezifera*, somewhat sunken, and the side and front margins of the clypeus gently emarginate (fig. 11); the pronotum is longer, larger, wider behind, and usually rounded off without distinct hind angles. The male genitalia are of different type, more as in *chiricahuae*.

Diplotaxis denigrata Bates

Figures 18, 116, 152

Diplotaxis trapezifera var. 4 *D. denigrata* BATES, 1889, p. 397 (Temax, north Yucatan, Mexico; type not designated; lectotype, male, here designated from original series in the British Museum).

RANGE: Southern Mexico from eastern Michoacan and Veracruz to Oaxaca and Yucatan; also El Salvador, Honduras, and Costa Rica (fig. 18). A total of approximately 1630 specimens has been examined. (See Appendix for further data.)

DIAGNOSIS AND DESCRIPTION OF LECTOTYPE, MALE: (See also characters of group). Marginal hairs of elytra long (short in lectotype because worn); second interval of elytra multipunctate in lectotype, usually irregularly unipunctate; pronotum with sides strongly angulate, angles obtuse; head flattened.

Length, 7 mm. Color dark red. Head in profile descending almost perpendicularly to clypeus, front slightly flattened but not concave, finely, densely punctured. Clypeal suture visible. Clypeus hairy, about one-third of the



FIG. 18. Distribution of *Diplotaxis denigrata*.

length of head, front margin scarcely emarginate or reflexed between sharp but obtuse angles, sides scarcely sinuate, not reflexed, punctures larger and denser than those on head. Eyes not sunk, each eye one-quarter of the width of head. Palpi with last segment not impressed. Labrum and mentum as in *denticeps*, except that labrum is same length as under side of clypeus, not shorter.

Pronotum convex, punctures as on head but sparser on disc, widest behind middle where also wider than widest point of elytra. Elytra as in *denticeps*, except that they are not more than twice longer than pronotum. Metasternum, pygidium, front tibiae, and tarsi (most of hind tarsi missing) as in *denticeps*, except that pygidium is large and has larger punctures. Genitalia of the species as in figures 116 and 152, basal piece shorter than lobes by about one-third.

SEXUAL DIMORPHISM: As in *denticeps*.

VARIATIONS FROM LECTOTYPE: Some specimens are rather tawny in color; some, almost black. The head in some specimens is more oblique, not so perpendicular as in the lectotype, and has the front convex, not flat, the punctures variable in density. There is often an impunctate area behind the clypeus, the latter being occasionally as long as one-half of the length of the head. The labrum is usually flat in front. Many examples have the second interval of the elytra unipunctate, at least in front, and the marginal hairs long. The length varies from 6 to 8 mm.

REMARKS: The lectotype (dissected) was designated from the first specimen of the original series in the British Museum (the specimen with the handwritten label).

This species resembles *trapezifera* quite closely (Bates considered it a variety of *trapezifera*), but it is generally darker in color, smaller in size, with a shorter clypeus which has angulate but usually not dentiform angles and scarcely reflexed or emarginate margins; the head is flat, not concave as in many specimens of *trapezifera*; the elytra have the second interval more often unipunctate than multipunctate; and the sides of the pronotum are more bulging. The male genitalia (figs. 115, 116) are very similar in the two species, but those of *denigrata* do not have the apices of the lobes drawn out and acuminate, or strongly bent downward. Although not so widespread as *trapezifera*, *denigrata* occurs in some of the same states of Mexico (Morelos, Chiapas, Veracruz, Oaxaca, and Yucatan), and in El Salvador, northern Honduras, and Costa Rica (figs. 17, 18). The male genitalia of both these species differ essentially from those of *angularis*, *bicolor*, and others in the way that the inner edges of the lobes come together at the middle and are separated between this point and the base, thus not being contiguous.

Another similar species is *bicolor* Bates (Veracruz, Oaxaca, Puebla) which differs from *denigrata* principally by having the sides of the pronotum even more strongly angulate and bulging, the elytra proportionately longer, the head as well as the clypeus with a few hairs, and the entire elytra thickly studied with punctures, the costae not at all distinct.

A species with about the same elytra as *denigrata* is *nigriventris* Bates which differs by having more emarginate clypeus and different type of male genitalia (figs. 134, 135). (See *yucateca* also for further comparison.)

Approximately 500 of the specimens examined are from two series collected by Bechtel and Schlinger in March, 1953, in Tuxtla Gutierrez and Chiapa, in the state of Chiapas, Mexico, taken at light, and nearly a thousand, also at night, from Pisté and Uxmal in Yucatan in early June of 1959, collected by P. and C. Vaurie.

***Diplotaxis megapleura* Vaurie, new species**

Figures 11, 124, 159

Diplotaxis megapleura VAU[R]IE, in Gibson and Carrillo, 1959, p. 110 (*nomen nudum*).

TYPE MATERIAL: Type, male, Tepic, Nayarit, Mexico, July 28, 1953, David Rockefeller expedition, C. and P. Vaurie, collectors, and 19 male paratopotypes (one collected August 4, 1953) in the American Museum of Natural History; one paratopotype in the California Academy of Sciences.

RANGE: Mexico, from Sonora south on the Pacific coast to Oaxaca and Chiapas, also Morelos and Puebla inland. (For data on the 480 additional specimens examined, see Appendix.)

HABITAT: Three males and two females were dug from loose soil beneath huisache (*Mimosa* sp.) by William W. Gibson and Philippe Barker, 6 miles south of Atlixco, Puebla, on May 8, 1957; the collectors state that the beetles had recently emerged from the pupal state. At the same time two males and three females of *angularis* were also taken. All the males were dissected.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra irregularly unipunctate (type) or multipunctate; pronotum with sides strongly arcuate and bulging behind middle, front angles rather sharp and produced, rather acute; hind angles obtuse; head slightly concave (type) or flat.

Length, 7.5 mm. Color dark red. Head and clypeal suture as in *denticeps*. Clypeus hairy, more than one-half of the length of head, punctures a little larger than those on head, front margin scarcely emarginate and strongly reflexed between bluntly dentiform angles, sides sharply obtusely angulate in front of eyes, thence slightly emarginate (bent inward) to front, the front and side margins being nearly equally emarginate. Eyes slightly sunk, large, each eye one-quarter of the width of head. Palpi with last segment flattened at base. Labrum and mentum as in *denticeps*.

Pronotum convex, punctures of disc fine as on head but sparser, center with short impunctate space, sides widest behind middle, rather sinuate to front and oblique to rear. Elytra a little more than twice as long as pronotum, punctures dense and twice as large as those on pronotum, punctures of second interval as large as those of striae, some of the punctures in double rows, costae slightly con-

vex, marginal hairs even longer than scutellum; epipleurae or deflexed elytral margin from hind coxae to the fourth abdominal segment as wide as the outer row of punctures. Metasternum as in *denticeps*. Pygidium convex, with large, deep, rather sparse punctures.

Front tibiae with third tooth virtually obsolete, represented by slight angulation. Hind femora not bulbous. Middle tarsi as in *denticeps*, hind tarsi with first segment only slightly shorter than second, hind tarsi longer than hind tibiae. Genitalia as in figures 124 and 159, basal piece longer than one-half of the lobes.

SEXUAL DIMORPHISM: The type and other males have the pygidium very transverse, more so than in females. Females have the eyes a little smaller than do the males, the abdomen rounded, not concave, the femora with the widest part nearly as long as the metasternum, and the hind tarsi not longer than the tibiae. The fifth abdominal segment seems shorter than the fourth in both sexes.

VARIATIONS FROM TYPE: The length of specimens ranges from 6.5 to 8.5 mm. Some specimens have the head more hollowed out in front, some are tawny or light red instead of dark (the series from Durango and from Oaxaca are paler); the clypeus may be as long as the head, the head oblique and flat; the sharp angle over the eye may be obliterated; the clypeal angles may be angulate instead of dentiform, the sides of the clypeus sinuate or straight; the impunctate space on the pronotum is not always present, the punctures of the elytra are not always much larger than those on the pronotum; the third tooth of the front tibiae may be a little more prominent; the pygidium may be densely punctured, and the epipleurae not so wide as in the type. The width of the lobes of the male genitalia varies from being narrower in specimens from Guerrero, Puebla, Morelos, and Huajuapán de León in Oaxaca to being extremely wide and stout in specimens from Oaxaca itself.

REMARKS: The characters serving to distinguish this species include the large eyes, the form of the clypeus (fig. 11), with its almost equally emarginated sides and front, the long, large pronotum with the sharp but not actually acute front angles behind which the head is often sunk as far as half the eyes, the rather long and dense hairs of the abdomen,

the rather thick front tarsal segments 2 to 4, and the wide epipleurae of the elytra as described above. The male genitalia (fig. 124) differ radically from those of the other forms of the group, with the exception of some specimens of *chiricahuae*, but the narrower lobes of that species are not so sinuate on the outer side. The latter is a species common in the southwestern United States and comes in contact with *megapleura* only in southern Durango, where it can be separated from *megapleura* by its broad, short, and virtually truncate clypeus, shorter pronotum, and the presence of minute hairs on the dorsum of the elytra (usually visible on sides and apex). The presence of long hairs on the margins of the elytra of *megapleura* distinguishes it from *tepicana* Moser (Tepic, Nayarit). The head, clypeus, front tarsi, and elytra (except for the long marginal hairs) are extremely similar to those of *saltensis* (Durango), but the pronotum of *saltensis* is short and transverse and coarsely punctured, and the male genitalia differ. These two species were collected in large numbers in two of the same localities in Durango on the same dates (San Antonio and J. Manuel, El Salto).

Of the species with long marginal hairs on the elytra, the present one is most similar to *trapezifera* and *angularis* externally, especially the female, and cannot always be separated from those species without dissection of the male. These three species have been taken in many of the same states of Mexico; five specimens of *megapleura* and five of *angularis* were collected from the same patch of soil at Atlixco, Puebla (see Habitat above). In series, however, the front of the head is more concave in most specimens of *megapleura*, the pronotum is longer and larger, with the widest part more bulging and nearer the base, not the middle, the front angles more pointed; the pygidium of the male more transverse and more densely and finely punctured; and the reflexed elytral margins wider apically.

This species has been found together with *denigrata* Bates in the state of Oaxaca (Oaxaca and 10 miles northeast of Juchitan), but not elsewhere. The wider epipleurae of *megapleura*, the more pointed front angles of the pronotum, the smaller pygidium, and stouter male genitalia should be sufficient to distinguish it from *denigrata*.

Tarsal segments 2 to 4 of the front legs are no more than twice as long as wide (as also in *trapezifera* and *saltensis*), whereas in *angustula*, for instance, they are about four times longer than wide.

It is of interest to note that the distribution of *megapleura* is like that shown in figure 89 for *commixta*, a quite different species of the *atramentaria* group, except that *megapleura* has not been reported from Colima in the west or from Hidalgo or Nuevo Leon in the east, and that *commixta* has not been reported from Puebla or Durango.

***Diplotaxis angustula* Moser**

Figures 14, 121, 156

Diplotaxis angustula MOSER, 1918, p. 299 (Guatemala; type, male, in the Zoologisches Museum, Berlin).

RANGE: From Guatemala and El Salvador north into Mexico as far as Colima in the west and Veracruz in the east. About 200 specimens have been examined. (See Appendix for further data.)

HABITAT: Two specimens from Panajachel, Guatemala, were taken "on avocado" in March, 1946, by W. C. Davis, two from Tuxtla Gutierrez, Chiapas, Mexico, on *Aca-cia*, and a series of 41 from Oaxaca, Oaxaca, Mexico, on *Enterolobium cyclocarpum* in July of 1955 by P. and C. Vaurie.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs long; second interval of elytra usually multipunctate, but occasionally irregularly unipunctate; pronotum with sides exaggeratedly bulging, front angles obtuse, hind angles rounded off; head usually with slight tumidity.

Length, 7 to 10 mm. Color tawny or dark red. Head descending obliquely to clypeus, usually tumid, never concave, but in some specimens merely convex, punctures dense, especially at center around the tumidity. Clypeus hairy, as long as head, or nearly as long, concave, punctures dense and two or three times larger than those on head; front margin slightly to strongly emarginate, strongly and broadly reflexed, in some specimens reflexed margin comprises one-third of the length of clypeus, angles blunt and rounded off, never dentiform; sides less re-

flexed, not sinuate, but straight or bending slightly inward from angle in front of eye. Eyes not sunk, each eye one-quarter or one-fifth of the width of head. Labrum flat, finely, densely punctured, shorter than reflexed under side of clypeus. Mentum flat, the short apical declivity indicated posteriorly by ridge and pubescence.

Pronotum convex, punctures on disc of same size as those on head but sparser, some specimens with short, longitudinal, impunctate space, sides widest slightly behind middle. Elytra two and one-half or three times longer than pronotum, punctures larger, in some specimens dense and confluent, costae in some specimens scarcely discernible among maze of punctures; marginal hairs at least as long as scutellum. Metasternum as in *denticeps*.

Front tibiae with third or basal tooth at middle or slightly in front of middle. Middle tarsi with first segment longer than second, hind tarsi with it shorter. Male genitalia as in figures 121 and 156; basal piece slightly shorter than lobes, often apices of lobes with dark band.

SEXUAL DIMORPHISM: Except for the longer tarsi of the male and the wider hind femora of the female (wider than the length of the second abdominal segment), it is difficult to distinguish the sexes without dissection. In many examples the more transverse pygidium of the male is recognizable as different, but some females also have it transverse; in most examples the hind tibial spur of the male is not longer than the first tarsal segment, but in some it is nearly as long as in the female.

REMARKS: Although a typical individual of this species is rather easy to identify because of the bulge of the pronotal sides (fig. 14), the lack of hind angles to the pronotum, the tumidity or pimple of concentrated punctures in the middle of the head, and the long, strongly reflexed, concave clypeus, many individuals diverge from this norm. Females cannot always be distinguished from females of other species of the group from the same localities, as *trapezifera* (at Manzanillo and Armeria in Colima, Tehuantepec, Oaxaca, and Tonala, Chiapas); *tehuana* (Salina Cruz and Tehuantepec, Oaxaca); *denigrata* (Tuxtla Gutierrez, Chiapas, and Tehuantepec); and

possibly even *angularis*. Of these, it resembles *tehuana* most strongly, in the long clypeus, pronotal sides, and male genitalia. (See *tehuana* for differences.)

The majority of specimens from El Salvador, Guatemala, and Tuxtla Gutierrez in Chiapas, Mexico, have the clypeus long and the head tumid, whereas a larger series from Oaxaca and a few specimens from Colima and Guerrero have virtually no tumidity, although the head is rather convex, and the clypeus in these examples is either long or short. The male genitalia in these populations are about the same, but those of some individuals in all populations differ slightly. The lobes are not so well sclerotized as in such species as *trapezifera* and *denigrata*, and they therefore become misshapen more readily. The characters are not uniformly constant in these populations, but I believe they represent one variable species.

The punctuation of the elytra and the shape of the sides of the pronotum are also variable. The bulge of the pronotum, as shown in figure 14, is nearer the middle of the sides than it is in *tehuana*, where it is nearer the base. The full extent of the curve cannot be judged from a strictly dorsal view because of the downward curve of the sides.

The last segment of the maxillary palpi is rather flattened, but in an individual from Guatemala City it is as deeply furrowed as in *Liogenys palpalis*; this individual is otherwise normal in appearance.

The type lacks the hind tarsi and most of the front tarsi and is much worn. The head has a slight tumidity; the clypeus is longer than the head.

***Diplotaxis tehuana* Vaurie, new species**

Figures 15, 19, 122, 157

TYPE MATERIAL: Type, male, Salina Cruz, Oaxaca, Mexico, July 17, 1947, Frank Johnson, donor, B. Malkin, collector, and eight male paratopotypes, in the American Museum of Natural History; four male paratypes in the United States National Museum from the same locality, but collected July 7 and 18, by Frederick Knab, no year given.

RANGE: The Pacific side of the Isthmus of Tehuantepec, southern Mexico; Nicaragua (?). In addition to the paratypes, 43 other

specimens have been examined from Oaxaca: Tehuantepec, July 12, 1955 (P. and C. Vaurie), two males, five females; vicinity of Tehuantepec, May, 1951, 1952, "at light," 19; Salina Cruz, July 17, 1947 (B. Malkin), 13 females, July 12, 15, 18 (F. Knab), four females. A male from Managua, Nicaragua, April 29, 1952 (R. Swain), may be this species (see below).

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra multipunctate; pronotum very strongly arcuate behind middle, front angles right, hind angles rounded off; head without frown.

Length, 8 mm. Color dark red, appearing black. Head descending abruptly to clypeal suture which is obsolete at middle, front somewhat flattened, finely, densely punctured. Clypeus scarcely hairy, almost as long as head, punctures a little larger than those on head, front and sides strongly reflexed to about same degree, front slightly emarginate, angles blunt and rounded off, sides indented in front of eye, thence converging obliquely to front without sinuation. Eyes large, not sunk, each eye from one-fourth to one-fifth of the width of head. Palpi flattened at base of last segment. Labrum flat, finely, densely punctured, shorter than reflexed under side of clypeus. Mentum flat, the short apical declivity indicated posteriorly by ridge and pubescence.

Pronotum very convex and large, punctured as on head, center with short, longitudinal, impunctate space, sides widest behind middle. Elytra two and one-half times longer than pronotum, punctures much larger and deeper; costae convex; marginal hairs longer than scutellum. Metasternum slightly depressed, nearly twice as long as the width of hind femora. Pygidium with large, irregular, and rather dense punctures.

Front tibiae with third tooth very small and placed in front of middle. Middle and hind tarsi and claws as in *denticeps*, except that they are stouter throughout. Genitalia as in figures 122 and 157, basal piece only slightly shorter than lobes.

SEXUAL DIMORPHISM: The type (male) and other males have long coarse hairs on at least the first three tarsal segments, these hairs being not quite thick enough to conceal entirely

the segments beneath; females have scattered hairs. The male has longer, thicker tarsi than the female and has the hind tibiae (fig. 19) bent slightly backward before the apex and with less flare than those of the female. In both sexes the longer spur of the hind tibiae is longer than the first tarsal segment; the spurs, however, are slightly narrower in the male. The pygidium is quite similar in both sexes.

VARIATIONS FROM TYPE: The size range is from 7 to 8.5 mm. The clypeus often has a kind of double edge following the border, as in the type; its punctuation may be much larger and the hairs more abundant than on the type; the front margin may be truncate. The short longitudinal space of the pronotum is not present in all specimens; some specimens have the curve of the pronotal sides very exaggerated towards the base. A dissected male from Tehuantepec has the clypeus only a little more than one-half of the length of the head. In some specimens the epipleurae of the elytra (the reflexed elytral margins) are wider than in others, but not so wide as in *concava* or *megapleura*, also of this group. Some males have a band of darker color across the apices of the lobes of the genitalia.

REMARKS: Although darker and smaller, this species is very similar to *angustula*, a more widely ranging species that occurs also in Oaxaca. Both species have a long clypeus and a very arcuate pronotum without hind corners. The principal differences between them are that *tehuana* has a flattened, not convex, head (some specimens of *angustula* have a flat head too), longer pronotum (fig. 15), with the large curve of the sides nearer the base, and sharper, slightly produced front angles that are more right than obtuse, a more truncate clypeus, thicker tarsal segments in the male, abundant yellow hairs on the first three tarsal segments in the male (viewed ventrally, the long hairs virtually covering the surface and as long as the segment), a longer spur on the hind tibiae in the male, and the hind tibiae in the male rather turned outward apically so that the inner edge forms a gentle curve (fig. 19). In the male the pronotum is nearly one-half of the length of the elytra. The male genitalia (figs. 121, 122) are thicker in *tehuana* and joined farther from the base (at basal third instead of basal fourth or

fifth), but otherwise are of the same general form as those of *angustula*. This species seems less variable than *angustula*, but one female has the sides of the pronotum as arcuate at the middle as do some specimens of *angustula*.

This is the only species of the group, with the exception of *roberti*, *incisa*, and *hirtipes*, that has very hairy male tarsi, but those species differ by having short, not long, marginal hairs on the elytra. A quite similar species not in this group, *ambigua* Fall from the United States and Sonora, Mexico, also has hairy tarsi in the male and hairs on the clypeus, but it has a groove above the pygidium and a very different pronotum.

The female of *tehuana* is difficult to separate from the female of *trapezifera*, but differs by lacking hind angles on the pronotum (in *trapezifera* the angles are obtuse and fairly distinct), and by having the sides of the pronotum more arcuate, their greatest width nearer the base than the middle.

A male from Managua, Nicaragua, is almost identical to the other males, except that the center of the abdomen is covered with very long yellow hairs, much as in males of *Diplotaxis fossipalpa* and *illustris* in another section of the genus. It is possible that this specimen represents a separate species (the male genitalia are almost the same as those of *tehuana*, but slightly wider), but I can find no characters other than the hairy abdomen to justify naming it. None of the other males of *tehuana* has hairs anywhere near this long.

***Diplotaxis concava* Vaurie, new species**

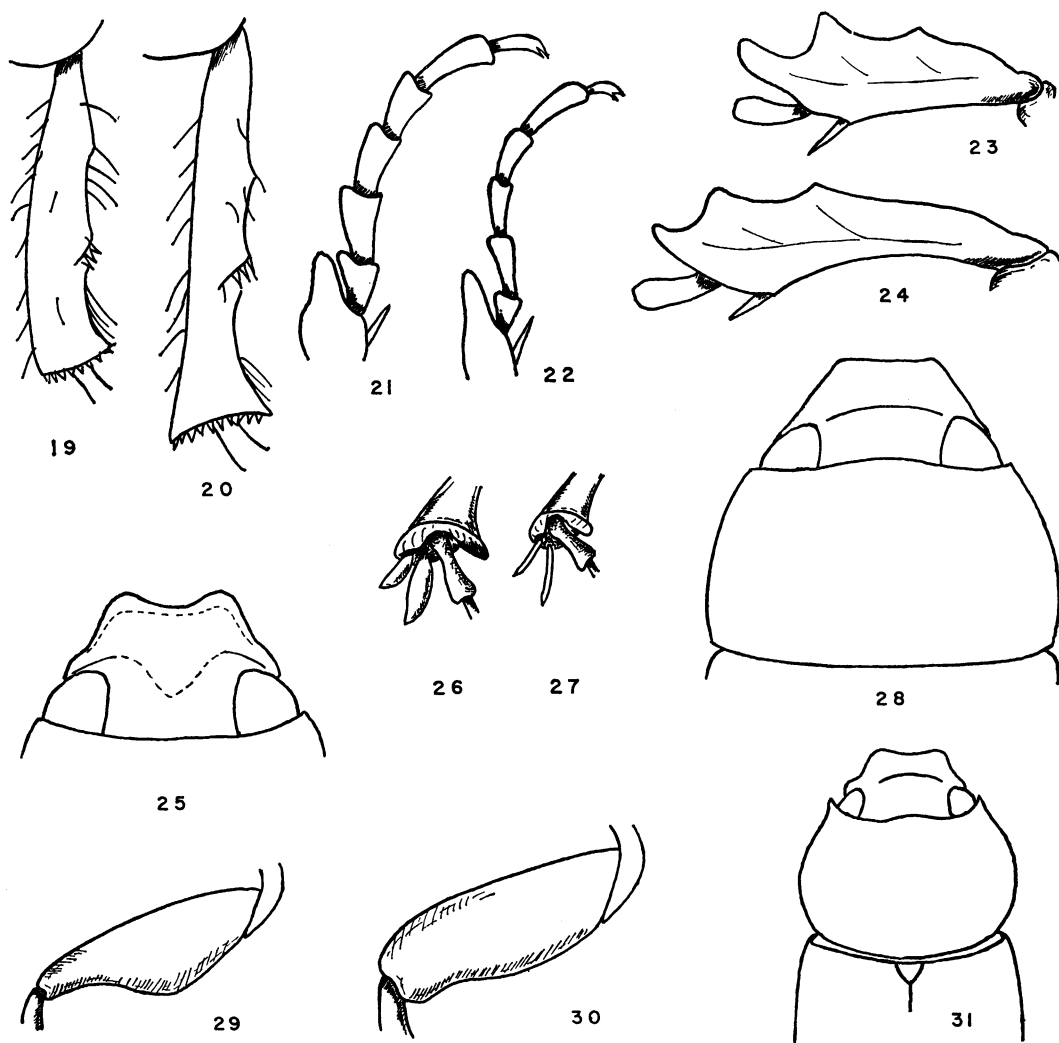
Figures 16, 20, 24, 121

TYPE MATERIAL: Type, male, El Mogote, near Taxco, Guerrero, Mexico, 5000 feet, June 1, 1954, R. K. Selander, collector, and three male and one female paratopotypes in the American Museum of Natural History.

RANGE: Known only from the type locality in northern Guerrero, south of Mexico City.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs long; second interval of elytra multipunctate; pronotum with sides arcuate at middle, front angles right, hind angles obtuse; head without frown.

Length, 10 mm. Color dark red. Head descending perpendicularly to clypeal suture



FIGS. 19-31. Body parts of *Diplotaxis* of *trapezifera* and *misella* groups. All to same scale, except for figure 31 (*incisa*) which is one-half smaller. 19. Left hind tibia of *D. tehuana*. 20. Left hind tibia of *D. concava*. 21. Left front tarsus of *D. macrotarsus*, male. 22. Left front tarsus of *D. macrotarsus*, female. 23. Right front tibia of *D. sonora*. 24. Right front tibia of *D. concava*. 25. Head and clypeus of *D. pala*. 26. Broad hind tibial spurs as in females of *D. latispina*. 27. Narrow hind tibial spurs. 28. *D. femoralis* (type). 29. Right hind femur of *D. femoralis*. 30. Right hind femur of *D. deserta* and *misella* group. 31. *D. incisa* (type).

which is obliterated at middle, densely punctured. Clypeus sparsely hairy, trapezoid, deeply concave and strongly reflexed in entire front half, almost as long as head, front margin only slightly emarginate between broadly rounded angles, sides angulate in front of eyes, thence obliquely to front without sinuation, punctures twice as large as those on head. Eyes slightly sunk, each eye about one-quarter of the width of head. Palpi with last

segment not impressed. Labrum flat in front, concave behind, level with, and one-half of the length of, the reflexed under side of clypeus; finely punctured. Mentum with a declivity in apical third that is posteriorly ridged and pubescent.

Pronotum rather flat, punctures of disc larger and sparser than those on head, on the sides dense, even confluent; sides widest a little behind middle, base of pronotum at center

with irregular impunctate space. Elytra as in *denticeps*, except that punctures are rather confluent, and epipleurae at a point opposite the fourth abdominal segment are as wide as they are opposite the first segment. Metasternum and pygidium as in *denticeps*.

Front tibiae with third tooth definitely in front of middle, the inner edge of tibiae curved inward towards apex from insertion of the spur (fig. 24). Middle tarsi with first segment slightly longer than second, hind tarsi with first two segments equally long, hind tarsi longer than hind tibiae. Genitalia about as in figure 121 of *angustula* but longer, basal piece shorter than lobes, as in *angustula*.

SEXUAL DIMORPHISM: The type and other males have the pygidium more transverse than does the single female available; the longer spur of the hind tibiae is the same length as the first segment of the hind tarsi, not longer as in the female, and it is narrower than in the female. The hind tibiae are less flared out apically in the male. The hind tarsi in the female lack the outer segments.

VARIATIONS FROM TYPE: The length ranges from 9.5 to 11 mm. One of the paratypes has the front of the clypeus emarginate, as in the type, but the others have it truncate. The sides of the pronotum may be widest at the middle instead of behind; in three of the paratypes the impunctate area of the pronotum extends nearly to the apex.

REMARKS: At first glance the large pronotum of *concava* with its evenly curved sides (fig. 16) and the head with the strongly concave clypeus remind one distinctly of *errans* Fall (Texas), an equally large species that differs from *concava* and from the other species of the *trapezifera* group by having the third tooth of the very large front tibiae situated behind the middle, and the hind tibiae of a different shape (figs. 20, 53).

In the *trapezifera* group, *concava* perhaps resembles *angustula* (southern Mexico and Guatemala) more than any other species, both in the long, advanced clypeus with its turned-up edge, and in the male genitalia (fig. 121). The pronotum, however, is not bulging as in *angustula*, but has the sides evenly rounded from base to apex, and the marginal hairs of the elytra are much shorter, at least in the five specimens examined, than they are in fresh specimens of *angustula* (in *angustula* the marginal hairs are longer than the scutel-

lum). The epipleurae of the elytra are even wider than they are in *megapleura*, a species widespread throughout Mexico.

Diplotaxis bicolor Bates

Figure 131

Diplotaxis trapezifera var. 3 *D. bicolor* BATES, 1887 (1887-1888), p. 159 (type not designated; lectotype, female, from Yolos [Oaxaca], Mexico, here designated from original series in the British Museum).

RANGE: From Veracruz, Puebla, and Oaxaca in southern Mexico south into Guatemala. Seventeen specimens have been examined (see Appendix).

HABITAT: Two specimens from Tehuacan, Puebla, were collected on flowers of *Eysenhardtia polystachya* (Ortega), of the family Caesalpiniaceae, by Paul D. Hurd in June, 1951, along with a larger series of *angularis*.

DIAGNOSIS AND DESCRIPTION OF LECTOTYPE, FEMALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra abundantly multipunctate; pronotum with sides very strongly, sharply angulate behind middle, angles obtuse; head without frown.

Length, 6.5 mm. Color dark red, the head and disc of pronotum darker. Head sloping obliquely to clypeus, finely, densely punctured, front slightly depressed behind clypeus. Clypeal suture obliterated at middle. Clypeus hairy, nearly as long as head, punctures larger than those on head, front margin slightly emarginate and shallowly reflexed between sharp but obtuse angles, sides not quite straight but bent slightly inward. Eyes slightly sunk, each eye about one-fifth of the width of head. Palpi with last segment not impressed. Labrum and mentum as in *denticeps*, except that labrum is same length as reflexed under side of clypeus, not shorter.

Pronotum convex, punctures fine but not quite so dense as those on head, sides widest behind middle; base slightly impressed and impunctate. Elytra as in *denticeps*, except that the costae are less convex, not so distinct. Pygidium finely, densely punctured. Front tibiae and middle and hind tarsi as in *denticeps*.

SEXUAL DIMORPHISM: It is very difficult to distinguish the sexes, but the male has the pygidium slightly more transverse and the hind tibial spurs a bit narrower than does the

female. Genitalia of the male as in figure 131, basal piece slightly shorter than lobes.

VARIATIONS FROM LECTOTYPE: Some specimens have no dark infuscations; some have the front of the head strongly concave, the clypeal angles dentiform, or the clypeal suture distinct, or the side margins more sinuate; some have the larger punctures of the clypeus invading those of the head; some have the sides of the pronotum rather sinuate at base; males with the eyes larger than in the lectotype; two specimens have the basal tooth of the front tibiae distinctly in front of the middle. The length ranges from 6.5 to 8 mm.

REMARKS: The characteristics of this species are the strongly arcuate, bulging sides of the pronotum, very long and thick marginal hairs of the elytra, very long recurved hairs on the abdomen and on the apices of the hind femora, and the abundance and density of the elytral punctures (in some specimens the punctures obscure the costae). Also in fresh specimens, as in those from Tule and Tepanistlahuaca, Oaxaca, hairs are visible on the front of the head in profile view, a character not present in any others of the group. The male genitalia (fig. 131) are short and simple in form, not at all like those of either *trapezifera* or *angularis*, two species that are externally quite similar to *bicolor* and occur in some of the same localities.

The pronotum is more angulate than that of *angularis*, the elytra are more thickly peppered with punctures, and the color is usually darker. Another difference between these two species is that *bicolor* has the elytral costae very narrow but with large punctures that are as wide as the costae so that the other intervals appear very wide in contrast, whereas *angularis* has the costae wider, with small punctures in the center third, therefore the costae are more distinct than those of *bicolor*, and the other intervals are not so wide as in *bicolor*.

For comparison with *trapezifera* and *denigrata*, see those species.

Diplotaxis tepicana Moser

Figures 116, 152

Diplotaxis tepicana MOSER, 1918, p. 300 ["Mexico (Tepic)" [Nayarit]; type, male, in the Zoologisches Museum, Berlin].

RANGE: State of Nayarit on the coast of northwestern Mexico, including Tres Marias archipelago about 50 miles off shore. Approximately 280 specimens have been examined from the type locality, Tepic; also six specimens from San Blas, April, July; two from Mecatan, May; and three males and one female from Maria Madre Island in the Tres Marias, May 15, 1925, collected by H. H. Keifer.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra short; second interval of elytra irregularly unipunctate or multipunctate; pronotum with sides gently arcuate behind middle, angles obtuse; head variable, either with slight depression, slight frown, or flat.

Length, 6 to 8 mm. Color usually a combination of black and red (red pronotum, black elytra, or mostly black but with red suture and borders), seldom tawny. Head rounded to clypeus, finely, densely punctured. Clypeus sparsely hairy, about one-half of the length of head, punctures larger, denser; front margin scarcely emarginate and only shallowly reflexed between bluntly obtuse angles; sides not reflexed and scarcely sinuate. Eyes not sunk, each eye one-quarter or one-fifth of the width of head. Labrum flat, densely punctured, same length as or slightly longer than reflexed under side of clypeus. Mentum rather flat but with very short declivity in apical fifth that is posteriorly margined and pubescent.

Pronotum with punctures of disc much sparser than those on head, in some specimens also finer; sides widest behind middle, in some specimens at basal third. Elytra less than three times longer than pronotum, punctures larger, costae rather flat; marginal hairs sparse, shorter than width of one sutural interval. Metasternum as in *denticeps*. Pygidium with large, sparse punctures, in some specimens smaller and denser.

Front tibiae with third tooth in front of middle. Hind femora as in *denticeps*. Middle tarsi with first segment slightly longer than second, hind tarsi with it slightly shorter. Hind tarsi longer than hind tibiae. Male genitalia as in figures 116 and 152 of *denigrata*, except that the lobes are narrower towards apex; basal piece slightly shorter than lobes.

SEXUAL DIMORPHISM: As in *denticeps*, except that the pronotum appears shorter in the female and its sides more arcuate. In any case the sexual differences are not very well marked.

REMARKS: This species, which seems to be restricted to the northwestern coast of Mexico around Tepic, differs from the majority of species of the group in the combination of generally fine and sparse punctuation of the pronotum and pygidium, small size, dark color (red with black), short marginal hairs of the elytra, short, non-dentiform clypeus with virtually truncate front margin, and elongate, acuminate male genitalia (similar to those of *trapezifera*). A few specimens, however (four from the Tres Mariás Islands, three from San Blas, and one from Mecatan), are tawny or dark red, without any black, and the punctuation varies individually, as is usual in the genus.

Two of the common species of the group that occur also in Nayarit, at Tepic and other places, are *trapezifera* and *megapleura*, both of which differ from *tepicana* principally by having long marginal hairs on the elytra. The former species was collected at Tepic with *tepicana* by C. and P. Vaurie in July of 1953 and by R. B. and J. M. Selander in 1955, and *megapleura* was taken also at the same time and place in 1953.

Burmeister's *parvula* has many of the same characters as *tepicana*, including the short marginal hairs and fine pronotal and pygidial punctures, but it has short male genitalia, with lobes joined near the base, and is known from farther south (in Oaxaca only).

Two species from Baja California (*polita*, *parpolita*) have short marginal hairs as in *tepicana* and similar coloration, but they have the pronotum short, with the sides widest near the middle, not the base, and the sides strongly constricted or cut back to the base, and the male genitalia short, not elongated as in *tepicana*, and of a different shape.

***Diplotaxis sonora* Vaurie, new species**

Figures 23, 116, 152

TYPE MATERIAL: Type, male, Hermosillo, Sonora, Mexico, July 19, 1952, C. and P. Vaurie, collectors, and three paratopotypes in the American Museum of Natural History; 20 male paratypes from Hermosillo, July 9

to 16, 1953, B. Malkin, collector, in the California Academy of Sciences.

RANGE: The states of Sonora and Sinaloa in northwestern Mexico. (For 107 additional specimens examined, see Appendix.)

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short; second interval of elytra mostly unipunctate; pronotum with sides strongly arcuate, nearly angulate, at middle, front angles rectangular, pulled slightly forward and downward, hind angles obtuse; head without frown.

Length, 8.5 mm. Color tawny. Head descending rather steeply to clypeal suture which is obliterated at middle; finely, densely punctured. Clypeus sparsely hairy, a little longer than one-half of the length of head, with larger and denser punctures than those on head, front margin broadly reflexed and emarginate between blunt obtuse angles, sides indented in front of eyes, thence narrowing obliquely without sinuation to front. Eyes not sunk, large, each eye one-quarter of width of head. Palpi with last segment apparently impressed. Labrum rather flat, at least in front, level with a trifle shorter than reflexed under side of clypeus. Mentum as in *denticeps*.

Pronotum rather flat, punctures of disc coarse, larger and sparser than those on head, sides widest at about middle, sides and base strongly margined. Elytra as in *denticeps*, except that second interval is unipunctate and marginal hairs are no longer than one sutural interval is wide. Metasternum one and one-half times as long as hind femora are wide. Pygidium large, very transverse, densely and rugosely punctured.

Front tibiae with third tooth very small in comparison with the apical teeth which are very large, third tooth at about middle of tibiae (fig. 23). Hind femora somewhat bulbous, hind tibiae stout. Middle tarsi with first segment longer than second, hind tarsi with it shorter than second, hind tarsi scarcely longer than tibiae. Genitalia about as in figures 116 and 152 of *denigrata*, except that the lobes are joined somewhat nearer the base, are proportionately narrower, and have the apices somewhat turned downward; basal piece a little shorter than lobes.

SEXUAL DIMORPHISM: Comparison of dissected males and females shows little observ-

able difference between the sexes, except that the pygidium is more triangularly shaped in the female and has the apex flattened in the type and other males, and both the pygidium and abdomen are more or less retracted in the male. There is not much difference in the hind femora and tibiae, but the tarsi are shorter than the tibiae in the female. The eyes appear smaller in females (each eye one-fifth of the width of the head).

VARIATIONS FROM TYPE: The size of specimens examined ranges from 6 to 9 mm. The margins of the clypeus and pronotum are darkened or black in some of the tawny specimens; 11 of the 22 specimens from Sinaloa are black or black with some red; others from Sinaloa are dark red, not tawny. The clypeus is truncate in some specimens, and in some the suture is visible. The punctuation of the pronotum is sparse and small in some individuals; two from Hermosillo have the sides of the pronotum scarcely arcuate at all, whereas some specimens have them even more arcuate than does the type. The second interval of the elytra may have the usual single row of punctures doubled at middle and rear. The pygidium is sparsely punctured in some specimens.

REMARKS: In addition to the characters in the diagnosis, this species is characterized further by its non-dentiform clypeus, short metasternum (scarcely longer than length of second abdominal segment), median tooth on the large front tibiae (fig. 23), distinctly angulate hind angles of the pronotum, and bulky hind femora, especially in the female in which they are wider than the second abdominal segment is long. The only other species of this section of the group known so far from Sonora and Sinaloa are *megapleura* and *chiricahuae*, both of which differ from *sonora* principally by having long hairs on the elytral margins, and a different, not elongate, type of male genitalia (figs. 124, 128).

This species is quite similar to *saltensis* (Durango) in the shiny elytra with the convex, not densely punctured, costae, but the male genitalia differ, as do the head (which is distinctly concave in front in *saltensis*), the clypeus (front angles dentiform in *saltensis*), and the pygidium (twice as large in *sonora*). It is similar also to *latispina* (Morelos) but differs in the long lobes of the male genitalia

and in the elytra (not crowded with tiny punctures as in *latispina*). Still a third rather similar species is *macrotarsus* from Chiapas and Yucatan and farther south. This species has somewhat the same elongate male genitalia and same clypeus as *sonora*, but differs by having a longer, less transverse pronotum, the front tibiae more or less bidentate, with smaller teeth, and much thicker tarsi.

The difference in coloration (see variations from type) between the specimens from Sonora and those from Sinaloa is quite marked in the series at hand, but the coloration may be phenotypic, because the specimens from Sonora are from inland in drier country, whereas those from Sinaloa (El Dorado) are from the coast itself, 151 kilometers southwest of the city of Culiacan. The male genitalia and other characters appear the same in the individuals from Sinaloa, although the pronotum is generally not so coarsely punctured as in most of the specimens from Sonora.

Some small specimens are not very different from the tiny *durango* (and the male genitalia are nearly the same), but *durango* has longer marginal hairs, proportionately shorter elytra, and the front of the head either roughened or slightly convex.

***Diplotaxis latispina* Vaurie, new species**

Figures 26, 128

TYPE MATERIAL: Type, male, Progreso, Morelos, Mexico, December 16, 1948, F. Osorio, collector, in the United States National Museum, and 20 paratypes (eight males, 12 females) from the same locality and taken in the same year but some with different dates and collectors: June 12 and 13 (J. J. McKelvey); June 18, July 4, "light trap" (Art C. Smith); July 11 and December 14 and 16 (F. Osorio). Paratypes in the United States National Museum, Cornell University, Instituto de Biología, Mexico City, and in the American Museum of Natural History.

RANGE: Known only from the type locality, a small settlement about 12 kilometers southeast of Cuernavaca in the state of Morelos, southern Mexico.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra of medium length; sec-

ond interval of elytra distinctly multipunctate; pronotum with sides scarcely arcuate, front angles right, hind angles obtuse; head slightly concave.

Length, 8 mm. Color light red-brown. Head in profile descending abruptly to clypeal suture which is barely visible, head rather densely punctured, front shallowly triangularly impressed at middle. Clypeus hairy, almost as long as head, trapezoid, front margin slightly emarginate and strongly reflexed between blunt obtuse angles, sides scarcely sinuate, punctures larger and denser than those on head. Eyes not sunk, each eye almost one-quarter of the width of head. Palpi with last segment flattened basally. Labrum and mentum as in *denticeps*.

Pronotum as in *denticeps*, except that punctures of disc are somewhat sparser than those on head. Elytra almost three times longer than pronotum, punctures of mixed sizes, some larger, some smaller, than those on pronotum, some rather confluent; costae convex; punctures of second interval in two and three rows; marginal hairs longer than a sutural interval is wide but not so long as scutellum; epipleurae of elytra as wide near apex as near middle (opposite hind coxae). Metasternum as in *denticeps*. Pygidium large, with deep, coarse, not very dense punctures.

Front tibiae as in *denticeps*. Hind femora not bulbous. Middle tarsi as in *denticeps*, hind tarsi scarcely longer than hind tibiae, first segment shorter than second by at least one-third. Genitalia as in figure 128 of *chiricahuae*, basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *denticeps*, except that the hind tibiae seem to be the same in both sexes; the hind tibial spurs are very wide in the female, often as wide as the base of the first tarsal segment (fig. 26).

VARIATIONS FROM TYPE: The length ranges from 7 to 8.5 mm. Some specimens have the clypeal suture definitely impressed. The head in five of the 21 specimens is flat, not concave as in the type. In many specimens the front of the clypeus is truncate, and the base has a slight, round tumidity. The eyes may be only one-fifth of the width of the head; the pronotal punctures may be denser than in the type, and in one specimen are sparser; the elytral punctures are very rugose in some examples.

REMARKS: This species resembles a number of others without being quite like any of them. It is characterized principally by being entirely densely, finely punctured, by having the sides of the pronotum only very gently curved; the marginal hairs of the elytra neither long nor short; the clypeus long, rather straight-sided, never dentiform; the reflexed elytral margins wide apically; and the hind tibial spurs of the female very wide. The male genitalia are about the same as those of *chiricahuae* Fall from farther north and of *cribraticollis* Blanchard from southern and central Mexico (the apices are not acuminate as in *cribraticollis*). The former has a somewhat similar clypeus but differs from *latispina* in the arcuate sides of the pronotum, the less crowded punctures of the elytra (second interval unipunctate or with double rows), and the longer marginal hairs. In some of these characters *latispina* differs also from *cribraticollis*, but more especially it lacks the quadridentate clypeus of that species (*latispina* has no dentiform angles on the clypeus). The male genitalia resemble also those of *sparsa* (Pacific coast of Mexico), but that species is exceedingly sparsely punctured dorsally.

The clypeus, head, pronotum, and elytra are very similar to those of *macrotarsus* from Guatemala, El Salvador, and southern Mexico, but that species has a longer pronotum, thick tarsal segments in the male, different genitalia, and no third tooth on the front tibiae.

Another species with a similarly shaped, but usually shorter clypeus is *consentanea* Bates from central and southern Mexico, but *latispina* differs from that species by having a longer pronotum in proportion to the elytra, stouter elytra with wider epipleurae, longer marginal hairs, and truncate, not pointed, lobes on the male genitalia.

The thickly punctured elytra recall those of *bicolor* Bates (Oaxaca, Puebla, Veracruz), a species with dentiform clypeus and bulging sides to the pronotum.

***Diplotaxis macrotarsus* Vaurie, new species**

Figures 21, 22, 32, 120

TYPE MATERIAL: Type, male, Variedades, Suchitepequez, Guatemala, July 2, 1947, 500

feet, F. Johnson, donor, C. and P. Vaurie, collectors, in the American Museum of Natural History, and 18 paratypes from Guatemala and Mexico (see Appendix for further data). Eight paratypes are deposited in the American Museum of Natural History; other paratypes are in the University of Michigan, the United States National Museum, the Muséum National d'Histoire Naturelle, Paris, the Zoologisches Museum, Berlin, and the Illinois Natural History Survey Division, Urbana.

RANGE: From Guatemala and El Salvador north to the states of Chiapas and Oaxaca in southern Mexico (fig. 32). All the localities are on or near the Pacific coast, with the exception of Guatemala City. The type locality is a plantation south of a settlement on the railroad called Guatalon. A total of 29 specimens have been seen in addition to the paratypes (see Appendix).

HABITAT: One of a series of 24 specimens collected by O. L. Cartwright in El Salvador was taken "ex debris leaf-cutting ants nest" (see Habitat in Introduction). Many of the other specimens were taken at light.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short, sparse; second interval of elytra unipunctate in front, double row of punctures behind; sides of pronotum gently arcuate, front angles slightly acute, hind angles obtuse; head without frown.

Length, 8.5 mm. Color dark red. Head sloping gently to clypeus, front with flattened area at middle, finely, rather densely punctured. Clypeal suture obliterated at middle. Clypeus with a few scattered hairs in front, clypeus nearly as long as head, trapezoid, front margin strongly reflexed, virtually straight, side margins very slightly sinuate, front angles obtuse, rather sharp, punctures as on head. Eyes large, not sunk, each eye one-quarter of the width of head. Palpi with last segment not impressed. Labrum and mentum as in *denticeps*.

Pronotum rather flat, punctures of disc larger and denser than those on head (except for an impunctate center area), very dense on sides, sides widest behind middle. Elytra about twice longer than pronotum, punctures larger; costae very narrow, indistinct; marginal hairs scarcely visible. Metasternum as

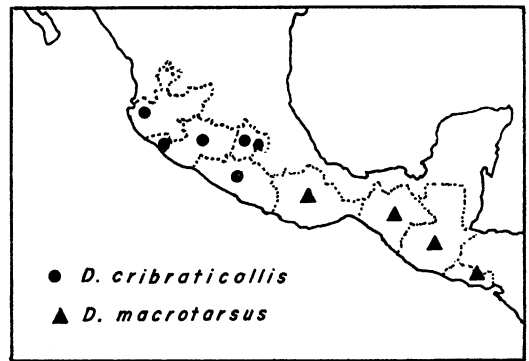


FIG. 32. Distribution of *Diplotaxis cribraticollis* and *D. macrotarsus*.

in *denticeps*. Pygidium not large, sparsely and irregularly punctured.

Front tibiae bidentate, the two teeth close together near apex. Middle and hind tarsi with first two segments about equal in length, the segments rather thickened throughout, not noticeably widened apically. Hind femora bulbous, their lower edge emarginate; hind tarsi about as long as tibiae. Claws gently curved, scarcely cleft, tooth minute. Genitalia as in figure 120 of *angularis*, basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *denticeps*, with the addition that the type and other males have all the tarsal segments about twice as thick as in the females, segments 2 to 4 on the front legs being not more than twice longer than wide (figs. 21, 22). The claws are also longer in males, nearly as long as the claw segment, and the clypeus is more reflexed. In both sexes the longer of the two hind tibial spurs is considerably longer than the basal segment of the tarsi, and in males it is exceedingly narrow throughout.

VARIATIONS FROM TYPE: Length, 7 to 9 mm. Some specimens are paler red; some have the head more abruptly descending to the clypeus and the labrum shorter (less than one-half of the length of under side of clypeus); some have the pygidium less sparsely punctured. Most of the paratypes have the front margin of the clypeus truncate as in the type, but two have the margin slightly emarginate at middle; two paratypes show a slight swelling where the third tooth of the front tibiae should be. Some specimens have the punctures of the clypeus dense and confluent.

REMARKS: This species differs from the majority of the species of the group by having the claws scarcely cleft, not strongly bent (figs. 21, 22), the front tibiae virtually bidentate instead of tridentate, the tarsal segments in the male noticeably thickened throughout and the posterior spiracles on the sides of the fifth segment distinctly elevated and margined, resembling small craters, round and shining and very prominent. It is further characterized by having the pronotum flat and long, with the sides not strongly arcuate, the pygidium in most specimens very sparsely punctured, the hind femora with the lower edge strongly arcuate, and rather emarginate at apex, the color dark, almost black, the ocular canthi usually sharply angulate, and the tarsi glabrous on the top and sides, the hairs present only on the soles below.

The tarsal segments of the male are not more than twice longer than wide, whereas in most species, as *angustula* Moser, each segment is at least four times longer than wide. The segments in *macrotarsus* are not only wider than in other species, but they are also wider basally, therefore not appearing so clavate. Even the female has these segments rather wide.

Superficially this species resembles *ohausi*¹ Moser which has been collected at the same time and place as the type of *macrotarsus*, in Variedades, Guatemala, and also in San Salvador, El Salvador, but it differs from *ohausi*, among other characters, by having the side margins of the clypeus oblique, not angularly indented in front of the eyes, the labrum short and concave, not long and flat, the mentum rather flat, not with an advanced declivity, the hind femora bulbous, and the first segment of the middle tarsi not longer than the second. The male genitalia (fig. 120) are not of the "pincer" type of *ohausi*.

In the *trapezifera* group, *macrotarsus* resembles dorsally, except in color, *latispina* (Progreso, Morelos), but differs from it in many details.

***Diplotaxis incisa* Vaurie, new species**

Figures 31, 137, 138

TYPE MATERIAL: Type, male, Mexcala, Guerrero, Mexico, July 9, 1955, "at light,"

¹ This species is discussed in part 1 (Vaurie, 1958).

R. B. and J. M. Selander, collectors, one male and five female paratopotypes, three of the latter taken July 17, 1957, same collectors, in the American Museum of Natural History. One male paratype from 11 miles southeast of Acatlan, Puebla, July 10, 1952, E. E. Gilbert, C. D. MacNeil, collectors, in the University of California at Berkeley.

RANGE: Southern Mexico in the southern part of the state of Puebla and the adjacent north central part of Guerrero.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short, sparse; second interval of elytra unipunctate; pronotum with sides strongly arcuate behind middle, front angles acute, hind angles ill-defined, rounded off; head without frown.

Length, 7.5 mm. Color dark red, head black. Head sloping steeply to clypeal suture which is obliterated; densely punctured. Clypeus hairy, nearly as long as head, punctures larger than those on head, front margin strongly reflexed, truncate, angles rounded off, sides abruptly indented in front of eyes, thence nearly parallel to front (fig. 31). Eyes somewhat sunk, large, each eye one-quarter of the width of head. Palpi with last segment impressed basally. Labrum flat in front, level with, and same length as, reflexed under side of clypeus, front margin strongly arcuate; finely punctured. Mentum strongly declivous in anterior third, posteriorly strongly margined and pubescent.

Pronotum convex, large, about twice longer than head and clypeus combined, punctures on disc of same size as those on head, but sparser; sides widest behind middle, slightly sinuate to the front angles; base with transverse impressed space. Elytra two and one-half times longer than pronotum, punctures larger than on pronotum; punctures of second interval as large as those of striae on each side; costae convex; marginal hairs as long as width of one sutural interval. Metasternum with an inverted V-shaped depression, scarcely one and one-half times longer than hind femora are wide. Pygidium densely punctured.

Front tibiae with third or basal tooth very small (present as a slight angulation in front of middle). Hind femora stout. Middle and hind tarsi as in *denticeps* except that hind

tarsi are slightly longer than hind tibiae. Genitalia as in figures 137 and 138, basal piece about the same length as lobes.

SEXUAL DIMORPHISM: The type (male) and other males have hairy pads on the tarsal segments, especially strong on the first two or three; females have long hairs but not pads. Both sexes have thick hind tibial spurs, and the longer of the two spurs is longer than the first tarsal segment. Both sexes have an apical flare to the hind tibiae, and the male has rather dense hairs on the inner side of the apex. The hind femora of the female are quite a bit wider than the second abdominal segment is long.

VARIATIONS FROM TYPE: The length ranges from 6.5 to 7.5 mm. One of the paratypes has no black on the head. The front margin of the clypeus in one male is slightly emarginate at the middle. The pygidium may be sparsely punctured on the sides. Three of the paratypes have the third tooth of the front tibiae represented by a mere swelling.

REMARKS: This species presents a number of unusual but not unique characteristics: the incised sides of the clypeus, the acute front angles of the large pronotum (fig. 31), the prominent mental declivity, large, wide hind femora, very short first segment of the hind tarsi, and in the male the hairy tarsal pads and sinuate lobes of the genitalia. It differs from *rufipes* Moser (Oaxaca) and *bifida*, new species (same two localities as *incisa*), both of which are also small in size and have a large pronotum with acute front angles, by having short marginal hairs, large eyes, strongly indented sides of the clypeus, strongly declivous mentum, and hairy tarsi in the male; the labrum is not at all bilobed as it is in *bifida*. The male genitalia are longer and more deeply sinuate at the middle than those of *bifida* or *rufipes* and have less pointed and less turned-down apices, but are nonetheless of a rather similar type. *Diploptaxis incisa* is of the same size and color and has the same pronotum as *pumila* Fall from the southwestern United States (not in the *trapezifera* group), but that species has a rounded clypeus and the sides of the abdomen ridged. The only other species of this group with truly acute pronotal angles in the front are five of the six species endemic to Baja California (*academia*, *flexa*, *mascula*, *parpolita*,

and *polita*), all of which have a different clypeus from *incisa*.

***Diploptaxis pala* Vaurie, new species**

Figures 25, 136

TYPE MATERIAL: Type male, Tepic, Nayarit, Mexico, July 28, 1953, David Rockefeller Mexican expedition, C. and P. Vaurie, collectors, in the American Museum of Natural History; one paratype, male, Canelas [Durango?], Mexico, in the Zoologisches Museum, Berlin.

RANGE: States of Nayarit and (?) Durango on the coast of northwestern Mexico.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short; second interval of elytra unipunctate; pronotum with sides scarcely arcuate, front angles right, hind angles obtuse; head concave.

Length, 6 mm. Color tawny. Head in profile descending rather abruptly to clypeal suture which is obliterated at middle, front with large, round, but faint impression, punctures rather dense but irregular. Clypeus hairy, concave, almost as long as head, slightly tumid at middle base, front margin broadly reflexed and distinctly emarginate between prominent and blunt obtuse angles, sides abruptly indented in front of eyes, thence nearly parallel to front angles, punctures larger than those on head. Eyes not sunk, large, each eye fully one-quarter of the width of head. Palpi with last segment not impressed basally. Labrum and mentum as in *denticeps* but mentum even flatter, and no ridge visible.

Pronotum scarcely wider than long, punctures of disc larger and sparser than those on head, sides widest at middle. Elytra only twice as long as pronotum, punctures larger, denser than on pronotum; punctures of second interval as large as those of striae on each side; costae convex; marginal hairs at least as long as one sutural interval is wide. Metasternum as in *denticeps*. Pygidium with punctures as large as those on elytra, irregular, somewhat dense. Abdomen with hairs of each segment nearly as long as the segment.

Front tibiae and hind femora as in *denticeps*. Middle tarsi with first segment shorter than second, hind tarsi missing in type, but

paratype has first segment only one-half of the length of second, and hind tarsus (only one present in paratype) longer than tibia. Genitalia as in figure 136, basal piece about as long as lobes.

SEXUAL DIMORPHISM: No female available.

VARIATION FROM TYPE: The paratype has the head sloping more obliquely than the type, the clypeus less emarginate in front, the pronotum slightly more transverse, the punctures of the second interval of the elytra even larger, and those of the costae very sparse in front.

REMARKS: The advanced, shelf-like or spade-like clypeus and very large eyes (fig. 25) resemble those of males of the *pilifera* group¹ of dorsally hairy species that are otherwise quite different. The clypeus resembles also that of males of *deserta* (*misella* group), but that species has no hairs on the clypeus and has smaller, sunken eyes. In the *trapezifera* group, *pala* can be compared with *nigri-ventris* Bates (Sinaloa), although *pala* has shorter marginal hairs, more advanced clypeus, a tumid elevation at the base of the clypeus, and different male genitalia (figs. 134, 136). Both species have long hairs on the abdomen, large eyes, and a slight depression on the head. On the other hand, *roberti* (El Mogote, Guerrero), a rather similar species, differs by having the head convex; also *femoralis* (Colima; Michoacan) which differs further by having strongly angulate hind femora.

Both males have been dissected; the inner edges of the lobes of the genitalia are not joined so close to the base as in many species of the group. Although the Tepic specimen lacks the hind tarsi and part of the front tarsi, it was chosen as type because of its exact locality and because it would be available in the institution that has the majority of other types of the genus.

***Diplotaxis roberti* Vaurie, new species**

Figure 136

TYPE MATERIAL: Type, male, El Mogote, near Taxco, Guerrero, Mexico, 5000 feet, June 1, 1954, Robert K. Selander, collector, and 20 male paratopotypes in the American Museum of Natural History.

¹ Discussed in part 1 (Vaurie, 1958).

RANGE: Jalisco, Michoacan, Guerrero, Morelos, and western Oaxaca in central and southern Mexico. In addition to the paratypes, 43 other specimens have been examined (see Appendix).

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra scarcely emerging; second interval of elytra multipunctate at middle, unipunctate in front; pronotum with sides only slightly arcuate, angles obtuse; head with slight frown.

Length, 6 mm. Color tawny. Head in profile gently sloping to clypeus, finely, densely punctured, forming ridge or ledge behind clypeus. Clypeal suture obliterated at middle. Clypeus sparsely hairy, one-half of the length of head, concave; front margin strongly reflexed and slightly emarginate between blunt obtuse angles, sides slightly sinuate, converging obliquely to front, punctures much larger than those on head and rather rugose. Eyes not sunk, large, each eye one-quarter (nearly one-third) of the width of head. Palpi with last segment not impressed at base. Labrum flat, same length as reflexed under side of clypeus, finely and densely punctured. Mentum with a declivity in apical fourth that is posteriorly strongly margined, pubescent, and ridged.

Pronotum rather flat, very transverse, punctures fine as on head, but on disc sparser, sides widest near middle but scarcely arcuate, base with transverse impunctate area. Elytra three times longer than pronotum, punctures slightly larger than those on pronotum; marginal hairs so short as to be scarcely visible. Metasternum slightly depressed, twice as long as the width of hind femora. Pygidium with confluent, rather dense punctures.

Front tibiae with third tooth distinctly in front of middle. Hind femora narrow, not bulbous. Middle tarsi with first two segments about equal in length, hind tarsi with first segment shorter than second by one-third; hind tarsi slightly longer than hind tibiae. Genitalia as in figures 136 of *pala*, but shorter and basal piece a little longer than lobes, and lobes on inner side joined together nearer base.

SEXUAL DIMORPHISM: As in *denticeps*, with the addition that the tarsi of the male, es-

pecially the first three segments, have long, abundant hairs that almost form pads.

VARIATIONS FROM TYPE: The length varies from 6 to 7 mm. Some specimens are dark red, some have the frown on the head either more prominent or less prominent than the type, a few have the mentum somewhat flatter and the clypeus longer. The elytral costae may be flat and scarcely differentiated from the intervals.

REMARKS: This species is named for Dr. Robert K. Selander, who has collected not only the large series of this species, but many others of interest from Mexico which he has generously donated for this revision.

The head, clypeus, and pronotum are almost exactly the same as in *femoralis* (fig. 28) from Colima and Michoacan, a very similar species which differs, however, by having strongly sinuate hind femora in both sexes (fig. 29), and acuminate, not pincer-like, genitalia in the male. Many of the characters given in the descriptions of *roberti* and *hirtipes* (also from El Mogote, Guerrero) are given in the descriptions as the same (labrum, head, eyes, elytra, legs, claws, hairy male tarsi, under side), but *roberti* is much smaller, has virtually straight, not strongly bulging, sides of the pronotum, a longer clypeus, with virtually straight, not sinuate, sides, and blunt, not acutely dentiform, angles; it has even shorter marginal hairs than *hirtipes*, scarcely visible in fact, and somewhat differently shaped genitalia.

Another species that resembles *roberti* in the very short marginal hairs and in the short hind first tarsal segment (even shorter than in *roberti*) is *glabrimargo* Vaurie and Cazier (Durango and Chihuahua), but that species has many differences including elongate male genitalia, large coarse punctures, and dentiform clypeus.

The sutural interval in some individuals of *roberti* is quite crowded with punctures as in *parvula* Burmeister.

***Diplotaxis femoralis* Vaurie, new species**

Figures 28, 29, 132

TYPE MATERIAL: Type, female, Colima, Mexico, and two female paratopotypes in the Senckenberg Natur-Museum, Frankfurt. One male paratype from "Mexico" in the American Museum of Natural History.

RANGE: The state of Colima on the Pacific coast of Mexico and the western part of neighboring Michoacan. In addition to the paratypes, a male specimen has been examined from Cerro Tancitaro, 2 kilometers north of Apo, Michoacan, 2700 to 2800 meters, July 1, 1947, collected by T. H. Hubbell.

DIAGNOSIS AND DESCRIPTION OF TYPE, FEMALE: (See also characters of group). Marginal hairs of elytra short, sparse; second interval of elytra unipunctate; pronotum with sides only slightly arcuate, angles obtuse; head with frown.

Length, 6 mm. Color tawny. Head sloping gently to clypeus, with a transverse ledge or frown over clypeal suture which is obliterated at middle; finely, sparsely punctured. Clypeus hairy, nearly as long as head, deeply concave, front margin reflexed and truncate between blunt, obtuse angles, sides converging obliquely to front without sinuation, punctures twice as large as those on head, but indistinct and rugose. Eyes not sunk, large, each eye one-quarter of the width of head. Palpi with last segment not impressed at base. Labrum flat, same length as reflexed under side of clypeus, finely punctured. Mentum as in *denticeps*, except that declivity is in apical fourth.

Pronotum transverse, punctures of disc larger than those on head, either dense or sparse, dense on sides; widest at about middle, base with transverse impunctate area. Elytra two and one-half times longer than pronotum, punctures larger and sparser, those of second interval as large as those of striae; costae convex; marginal hairs sparse, no longer than width of one sutural interval. Metasternum as in *denticeps*. Pygidium with large, rather sparse punctures.

Front tibiae with third tooth distinctly in front of middle. Hind femora markedly angulate or bulbous at middle on lower edge (fig. 29). Middle tarsi with first two segments about equal in length, hind tarsi with first segment shorter than second by one-third, hind tarsi no longer than hind tibiae.

SEXUAL DIMORPHISM: The pygidium is pointed in the type and other females but transverse in the males. The male has longer, more hairy, tarsi, the hind tibiae less flared out at apex. The longer of the hind tibial spurs is the same length as the first tarsal

segment in the male, but is longer in the female. The genitalia of the male are as shown in figure 132 of *parvula*; the basal piece is shorter than the lobes.

VARIATIONS FROM TYPE: The length ranges from 6 to 6.5 mm. The clypeal suture is visible at the middle in two specimens, the front margin slightly emarginate in one specimen; the eye in the male paratype is nearly one-third of the width of the head. The elytral punctures may be denser than in the type, the marginal hairs scarcely visible. The punctures of the pygidium are dense and rugose in one paratype.

REMARKS: This tiny species (fig. 28) differs from all others of the group by having the hind femora in both sexes abruptly widened at the middle (fig. 29, and compare fig. 30). Except for this character and for the attenuated, not pincer-like lobes of the genitalia of the male (fig. 132), this species resembles *roberti* (from Michoacan and other states) in almost every detail. Superficially *femoralis* is also like *academia* of Baja California, but that species has the teeth of the front tibiae spread out as in figure 47 of *flexa*, not all bunched in front of the middle as in *femoralis*; and the front angles of the pronotum acute, not right angles.

In addition to *roberti* and *femoralis*, other small species with short marginal hairs, large eyes, and the sides of the pronotum not strongly arcuate are *pala* (Nayarit northward along the Pacific coast), which has the head concave, and the clypeus very advanced and deeply emarginate; and some of the species in the section with *superflua*, all of which differ by having the front of the head concave and the elytral costae very convex and shining and scarcely punctured. The type of *nigriventris* Bates also differs from *femoralis* by having the head concave and the pronotum more strongly arcuate, but a second specimen has long, not short, marginal hairs on the elytra.

The male from Cerro Tancitaro differs from the paratypes by having a black head, and its genitalia are slightly different from those of the male paratype. This locality is north of Apatzingan, on the border of the state of Jalisco, to the east of the state of Colima.

The only other species of the genus with

such strongly angulate femora is *macronycha* Fall, a species with reduced wings in the *connata* group, and females of *urbana* (*frondicola* group).

Diplotaxis nigriventris Bates

Figures 134, 135

Diplotaxis nigriventris BATES, 1887 (1887-1888), p. 160 (Presidio [Sinaloa], Mexico; type, male, in the British Museum).

RANGE: Known only from the state of Sinaloa, northwestern coast of Mexico. The type from Presidio, and one other male from Venodio [north of Mazatlan], June, 1930 (Kusche), have been examined.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short in type (worn?), long in second specimen; second interval of elytra unipunctate; pronotum with sides strongly arcuate behind middle, angles obtuse; head without frown.

Length, 7 mm. Color, head and abdomen rather blackish, remaining parts dark red. Head gently sloping to clypeus, somewhat flattened on front which is finely, sparsely punctured, top of head densely punctured. Clypeal suture obliterated at middle. Clypeus hairy, more than one-half of the length of head, more sparsely punctured than head, front margin with a shallow V emargination between prominently reflexed, rounded-obtuse angles, side margins obliquely narrowed to front and scarcely sinuate. Eyes not sunk, large, each eye one-quarter of the width of head. Palpi hidden. Labrum and mentum as in *denticeps*.

Pronotum flat, punctured, at least on sides, more deeply and densely than on top of head, sides widest behind middle, base somewhat depressed. Elytra nearly two and one-half times longer than pronotum, punctures dense, larger than on pronotum, those of second interval taking up all the interval and as large as the striae punctures on each side; costae convex; marginal hairs probably worn. Pygidium densely punctured, with punctures as large as those on elytra.

Front tibiae with third tooth represented by slight swelling. Middle tarsi with first two segments about equal in length, hind tarsi with the first segment distinctly shorter

than second. Genitalia of the species as in figures 134 and 135; basal piece shorter than lobes.

SEXUAL DIMORPHISM: No female available, but the male has the first segment of the hind tarsi as long as the longer of the tibial spurs, the pygidium transverse and slightly retracted.

REMARKS: This small species resembles *yucateca*, a southern species, but differs from it by having the third tooth of the front tibiae virtually obsolete, the clypeus longer and more emarginate, the lobes of the male genitalia with more pointed apices. The genitalia differ even more radically from those of *roberti* (central and southern Mexico), although the clypeus is rather similar, and *nigriventris* has no frown on the front as in *roberti*, no hairy tarsi in the male, and more evident marginal hairs on the elytral sides.

I have left the description of the type above as I wrote it in the British Museum, because I am not absolutely certain that the second specimen examined (in the collection of the United States National Museum) is the same species. This specimen disagrees with the type in the following respects: It is 6 mm. long and comes from Venodio, not far from Presidio and Mazatlan. It has long marginal hairs (longer than the width of one sutural interval), has the scutellum completely covered with punctures (the type has only eight or 10 punctures at the sides of the base), has the head more deeply and coarsely punctured, the abdomen tawny, not black, and the remainder of the body also tawny, not dark red. The male genitalia of the Venodio specimen (figs. 134, 135) also seem more acuminate than those of the type (not figured).

***Diplotaxis yucateca* Vaurie, new species**

Figure 132

TYPE MATERIAL: Type, male, Chichen Itza, Yucatan, Mexico, June 13, 1955, E. C. Welling, collector, and two female paratypes, one with the same data as the type, one collected June 15, 1955; also 19 male and two female paratypes from Pisté, Yucatan, June 3 to 5 and 8 to 10, 1959, P. and C. Vaurie, collectors; all in the American Museum of Natural History.

RANGE: Yucatan and Chiapas in southern

Mexico; also El Salvador, Honduras, and Costa Rica. In addition to the 21 paratypes, 343 specimens have been examined (see Appendix).

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra unipunctate; pronotum with sides strongly arcuate behind middle, front angles obtuse, hind angles rounded off; head without frown, flattened on front.

Length, 6 mm. Color dark red, appearing black. Head descending perpendicularly to clypeal suture which is obliterated, rather sparsely punctured. Clypeus sparsely hairy, about one-third of the length of head, front margin shallowly reflexed and scarcely emarginate between blunt obtuse angles, sides bending slightly inward from eye, punctures rather confluent, larger and denser than those on head. Eyes not sunk, large, each eye one-quarter of the width of head. Palpi not impressed on last segment. Labrum flat, strongly punctured, same length as and level with reflexed under side of clypeus. Mentum as in *denticeps*.

Pronotum with punctures on disc of same size as those on head but sparser, sides widest behind middle. Elytra not quite three times longer than pronotum, punctures twice as large as and denser than those on pronotum; punctures of second interval as large as those of striae; costae rather flat; marginal hairs a little longer than width of a sutural interval. Metasternum as in *denticeps*. Pygidium with sparse, very shallow punctures as large as those on elytra.

Front tibiae with third tooth distinctly in front of middle. Hind femora not bulbous. Middle and hind tarsi as in *denticeps*, except that the hind tarsi are only slightly longer than the hind tibiae. Genitalia as in figure 132 of *parvula*; basal piece shorter than lobes by about one-third.

SEXUAL DIMORPHISM: The only external difference found between the sexes is that the type and other males have the hind femora and the hind tibial spurs narrower than do females, the pygidium somewhat more transverse, and the hind tarsi longer.

VARIATIONS FROM TYPE: The length ranges from 6 to 8 mm. In some specimens the punctures on the head are sufficiently dense as

nearly to touch one another, and the punctuation of the pronotum, pygidium, and propygidium is not so sparse as in the type. The punctures of the second interval of the elytra in a few individuals are somewhat irregular and may even be in a double row towards the apex of the elytra. The sides of the clypeus are more indented and the surface is more hairy in some specimens, and the clypeus in two individuals is longer than one-third of the length of the head. The front of the head is rather concave in many specimens.

REMARKS: This species is very similar externally to *denigrata* Bates (type locality, Temax, Yucatan), except for its finer and sparser punctuation of the head, clypeus, pronotum, and especially of the pygidium and propygidium. The specimens occur, sometimes abundantly, in some of the same localities in southern Mexico and in Central America, although *yucateca* does not occur so far north as *denigrata*. Typical specimens of *yucateca* are readily distinguished by their sparse punctuation, but many of the specimens examined from Yucatan have the punctuation nearly as dense as in *denigrata* (*denigrata* is never sparsely punctured as is *yucateca*). The front of the head is usually more concave in *yucateca*, and, in general, the size is smaller and the color darker. The male genitalia of the two species, however, are distinct; the lateral lobes of *yucateca* are short and horizontal and joined at their inner edges near the base, whereas those of *denigrata* are almost twice as long as those of *yucateca*, are slightly decurved and joined at the middle. In addition, most specimens of *yucateca* have a transverse band of darker color across the apices of the lobes that is lacking in *denigrata*. (In *angustula* and *tehuana* the lobes are bicolored in this manner also.)

In Yucatan in June, two or three nights of collecting at Uxmal resulted in 335 specimens of *yucateca* to 161 of *denigrata*, but a week of night collecting at Pisté by the same collectors brought only 21 of *yucateca* but 791 of *denigrata*. Not more than 30 specimens of any other species were taken at this time. The other species found in Yucatan are in different groups except for *trapezifera* Bates; they are *maya* and *simplex*, glabrous species; and *poropyge* and *puncticollis*, hairy species.

This species can be confused with a number

of other small species of the group. The fine and sparse punctuation recalls *parvula* (Oaxaca) and *sparsa* (Pacific coast of Mexico), and the male genitalia are of the same general type as those of *parvula*, but *yucateca* differs from the latter by having long, not short, marginal hairs; large, not small, eyes; the suture of the elytra with a single row of punctures; and the front of the head flattened or concave but not triangularly impressed. As for *sparsa*, it has a much broader head and clypeus than does *yucateca*, a longer clypeus with rounded-off, not angulate, front margin (fig. 36), and different male genitalia. In *yucateca* the clypeus is angulate in shape, even though the angles are blunt; the side margins curve slightly inward, especially in the two specimens from Honduras and Costa Rica.

Diploptaxis tumida Vaurie, new species

Figures 118, 152

TYPE MATERIAL: Type, male, 25 kilometers east of Morelia, Michoacan, Mexico, June 14, 1955, at light, R. B. and J. M. Selander, collectors, and 21 male paratopotypes in the American Museum of Natural History.

RANGE: The states of Michoacan, Guerrero, and Puebla in southern Mexico. In addition to the type material, one female has been examined from Puebla state; one male and two females have been seen from Toluapan, Guerrero, June 12, 1957, at light, Wm. W. Gibson, collector, and 140 from the type locality, with the same data.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra very short; second interval of elytra multipunctate; pronotum with sides gently arcuate behind middle; front angles right, but appear somewhat acute, hind angles obtuse; head without frown.

Length, 9 mm. Color tawny. Head in profile descending rather abruptly to clypeal suture which is indistinct at middle, head finely, not densely punctured. Clypeus sparsely hairy, about one-half as long as head, punctures somewhat denser than those on head, front margin shallowly V shaped between strongly reflexed, bluntly dentiform angles, sides converging narrowly to front without sinuation. Eyes not sunk, large, each eye one-quarter of the width of head. Palpi with last

segment impressed basally. Labrum and mentum as in *denticeps*.

Pronotum rather flat, punctures about the same as those on head, sides widest behind middle; angles slightly and shallowly impressed within, hind angles along base of pronotum convex and impunctate. Elytra as in *denticeps* except that the marginal hairs are shorter than the width of a sutural interval and scarcely visible. Metasternum twice longer than width of hind femora. Pygidium very large, with large rugose punctures that are partly confluent.

Front tibiae and middle and hind tarsi as in *denticeps*. Hind femora not bulbous, about two and one-half times wider than hind tibiae. Genitalia as in figures 118 and 152; basal piece slightly shorter than lobes.

SEXUAL DIMORPHISM: About as in *denticeps*, except that the hind femora are equally narrow in both sexes. The hind tibiae of the type and other males are scarcely widened at apex.

VARIATIONS FROM TYPE: The paratypes and other specimens range in length from 7.5 to 9 mm. In some of these the clypeal suture is distinct and sinuate at middle. An impunctate area may be present at the middle of the pronotum; the front angles of the pronotum are usually not truly impressed. The marginal hairs of the elytra in many specimens are scarcely visible. The head may be more densely punctured than is that of the type.

REMARKS: This species is similar to *consentanea* Bates in many respects (short marginal hairs of elytra; short first segment of hind tarsi; large eyes; long, thin, straight, hind tibiae of male), and was collected in large numbers at the same time and place (Morelia, Michoacan). It appears, however, to be much more restricted in its distribution than the more widespread *consentanea*. It differs from *consentanea* by having the clypeus more emarginate and proportionately narrower in front, the pygidium larger, the pronotum longer, much widened behind, and with impressions within the hind angles, different male genitalia (figs. 118, 132). It is generally larger and paler in color than *consentanea*, with a larger pronotum but a smaller head. The abdominal hairs, especially those on the second segment, are denser and longer and distinctly curved, whereas in *consentanea* they are short and

straight. Another species with these same recurved hairs on the abdomen is *denticeps* Bates which has also a very similarly shaped pronotum to that of *tumida*; it differs, however, from *tumida* by having the clypeus quadridentate, the front angles acute, the head concave in front, and the marginal hairs of the elytra long. Another similar species in some of its variations is *trapezifera* Bates, but that species has long marginal hairs on the elytra. All these species mentioned differ in the male genitalia.

Diplotaxis consentanea Bates

Figure 132

Diplotaxis trapezifera var. 1 *D. consentanea* BATES, 1887 (1887-1888), p. 159 (type not designated; lectotype, male, Orizaba [Veracruz, Mexico], here designated from part of original series in the British Museum).

RANGE: Mexico from the states of Hidalgo and Puebla in the southeast and Jalisco and Aguascalientes in the west, south to Oaxaca and Veracruz. Over 100 specimens have been examined (see Appendix for further data).

DIAGNOSIS AND DESCRIPTION OF LECTOTYPE, MALE: (See also characters of group). Marginal hairs of elytra short; second interval of elytra multipunctate; pronotum with sides scarcely arcuate, angles obtuse; head without frown.

Length, 7.5 mm. Color tawny. Head vaguely flattened in front, descending obliquely to clypeal suture which is distinct, bisinuate, bending backward at middle; head finely, densely punctured. Clypeus hairy, as long as one-half of the length of head, front margin scarcely emarginate or reflexed between the acute angles, side margins slightly sinuate, not reflexed, punctures denser and larger than on head. Eyes not sunk, large, each eye one-quarter of the width of head. Palpi with last segment not impressed. Labrum and mentum as in *denticeps*.

Pronotum flat, transverse, not longer than head and clypeus combined (head is exerted), punctures on sides coarser than those on head, on disc of same size as those on head but sparser; sides widest behind middle; base with transverse impressed area, hind angles at base convex and impunctate. Elytra more than three times longer than pronotum, punc-

tures of about same size as those on pronotum but sparser; costae convex, distinctly elevated; marginal hairs shorter than width of a sutural interval. Metasternum as in *denticeps* [except that it is nearly three times longer than hind femora are wide].¹ Pygidium not large, irregularly punctured.

Front tibiae with third tooth slightly in front of middle. [Hind femora narrow, less than twice wider than hind tibiae.] Middle tarsi with first two segments about equal in length, hind tarsi with first segment noticeably shorter than second, hind tarsi at least as long as hind tibiae. Genitalia of the species nearly as in figure 132 of *parvula*, but more elongate; basal piece distinctly shorter than lobes.

SEXUAL DIMORPHISM: The hind tibiae of the lectotype (male) and other males are virtually straight, whereas in females they are widened apically as is usual in the genus. Other sexual differences are as in *denticeps*, except that the pygidium does not show much difference between the sexes.

VARIATIONS FROM LECTOTYPE: The color varies from tawny to dark red; the length, from 6.5 to 8.5 mm. In some specimens the clypeus is only one-third of the length of the head, with its angles either dentiform or obtuse but sharp; its front margin may be more emarginate and more reflexed than in the lectotype, or it may be truncate; the labrum may be shorter than the reflexed under side of the clypeus. Usually the pronotum is longer than the head and clypeus combined, and usually much more coarsely and densely punctured than the head, the impressed area at base usually more marked than in the lectotype. The marginal hairs of the elytra, although scarcely visible in the lectotype, are generally readily visible, but short, although in some instances they are longer than the width of a sutural interval. The sides of the pronotum may be more arcuate.

REMARKS: Although many variations occur in this species, the proportion of the short pronotum to the long elytra seems to be constant and more marked than in species such as *angularis*, *trapezifera*, and *latispina*. A number of specimens seem not quite to agree

¹ Characters within brackets were not noted at the time of examination of the lectotype and have been added from other specimens.

with this species, especially a series of two males and one female from Los Reyes, near Mexico City, which have the elytra somewhat shorter than usual, the second interval of the elytra more or less unipunctate, the color black, and the eyes rather smaller. The male genitalia are about the same, however, and I am referring these specimens to this species.

This species, considered by Bates one of the varieties of *trapezifera*, occurs sparingly in some of the same states as *trapezifera* (Colima, Jalisco, Oaxaca, Veracruz), but the only large series I have seen consists of 70 specimens from Morelia, Michoacan (collected by R. B. and J. M. Selander), a state from which *trapezifera* has not been recorded. This is the only one of Bates's varieties that has short, not long, marginal hairs on the elytra. It is most similar to another species with short marginal hairs and a convex area at the hind angles, *tumida*, which occurs also in great abundance at Morelia (see that species, also *latispina*, for further comparison). The tarsi are longer and their segments longer and narrower than those of *trapezifera* or those of *angularis* LeConte.

The clypeus and head and male genitalia resemble those of *parvula* Burmeister (Oaxaca), except that the lobes of the genitalia are more acuminate and bent downward in *consuetana*. The pronotum, punctuation, tarsi, and other characters of the two species differ.

Bates (1887-1888) gives additional localities for this species, but the specimens from these places (examined by me) were misidentified.

The spelling *consuetana* by both Dalla Torre (1912, p. 149) and Blackwelder (1944, p. 223) is an error.

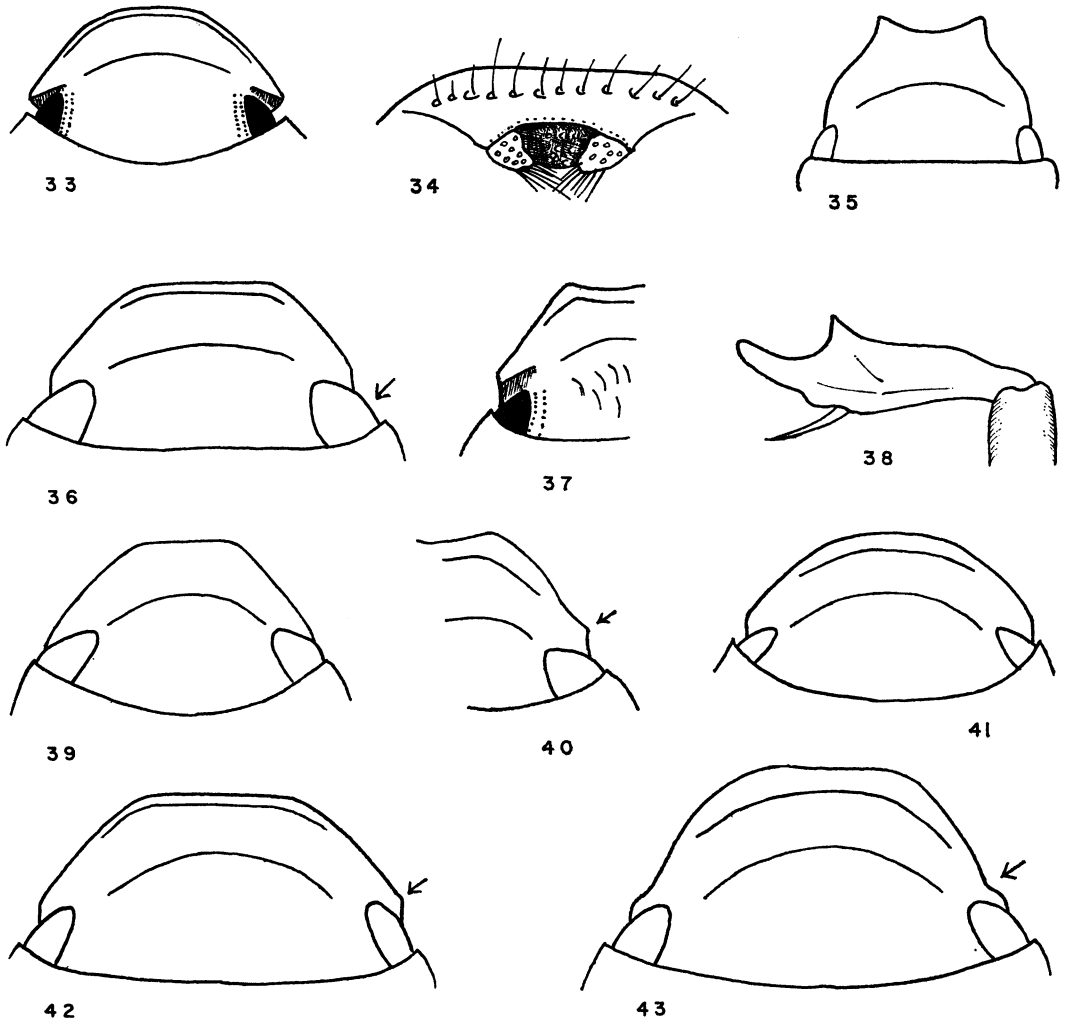
***Diplotaxis crucis* Vaurie, new species**

Figure 133

TYPE MATERIAL: Type, male, 15 miles west of Las Cruces, Chiapas, Mexico, July 27, 1952, E. E. Gilbert and C. D. MacNeil, collectors, and one female paratopotype in the University of California at Berkeley; a female paratopotype in the American Museum of Natural History.

RANGE: Known only from the type locality which is near the western border of Chiapas about 20 miles north of Arriaga.

DIAGNOSIS AND DESCRIPTION OF TYPE,



FIGS. 33-43. Body parts of some *Diplotaxis*. All figures at same scale except figures 34 and 38, which are one-half larger. 33. *D. bifida* (head tipped back slightly). 34. *D. bifida*, the bifid labrum. 35. *D. iguala*, showing small eyes. 36. *D. sparsa*, showing large eyes; characteristic also of *D. sinuans*. 37. *D. pinalica*, three-quarter view, showing ocular canthus and sunken eye. 38. *D. brachyptera*, bidentate front tibia. 39. *D. rufiola*. 40. *D. punctipennis*, showing angular canthus. 41. *D. pacata*. 42. *D. trementina*, showing canthus and small eyes. 43. *D. sulcatula*, showing indentation of canthus.

MALE: (See also characters of the group). Marginal hairs of elytra long; second interval of elytra multipunctate; pronotum with sides strongly arcuate, front and hind angles obtuse; front of head flattened.

Length, 8 mm. Color dark red, elytra with greenish sheen in certain lights. Head sloping obliquely to clypeus, somewhat flattened and more densely punctured in front, punctures sparser behind. Clypeal suture impressed, bent back sinuately at middle. Clypeus trape-

zoid, sparsely hairy, slightly longer than one-half of the length of head, punctures of same size as those on front of head but uniformly dense (touching), front margin truncate between rounded angles, reflexed to about width of margin, sides oblique. Eyes not sunk, each eye nearly one-fourth of the width of head. Palpi with no impression on last segment. Labrum flat in front, concave behind, about same length as under side of clypeus, densely and shallowly punctured, front margin nearly

straight. Mentum with slight declivity in apical fourth that is posteriorly margined and pubescent.

Pronotum convex, transverse, punctures of disc of same size as those of head, but widely separated, sides widest behind middle and weakly impressed within side margin in basal third. Elytra as in *denticeps*, except for the fact that the costae are so narrow or crowded with punctures from each side as to be scarcely recognizable as costae. Metasternum and pygidium as in *denticeps*.

Front tibiae with third tooth distinctly in front of middle. Hind femora and tibiae and middle tarsi as in *denticeps*. Hind tarsi with first segment slightly shorter than second. Genitalia as in figure 133; basal piece torn.

SEXUAL DIMORPHISM: As in *denticeps*, except for the hind tibial spurs which are not longer than the first hind tarsal segment in the male. In addition, females have the short sixth segment of the abdomen exerted.

VARIATIONS FROM TYPE: With only two paratypes at hand, the apparent variations are small. The length of the other specimens is 7.5 mm. Both have the center of the pronotum slightly greenish and the punctures sparse but more regularly spaced than in the type. The clypeus is very slightly emarginate in one of the females.

REMARKS: The densely punctured elytra, with their virtually obliterated costae, the rounded front angles of the clypeus, the shape of the pronotum, the short labrum, and the exposed sixth abdominal segment of the female are almost the same as in the dorsally hairy species, *puncticollis* (*puberula* group), which, with its allies *crinigera* and *cavifrons*, even has the lobes of the male genitalia (although much shorter) as strongly curved as those of *crucis* (fig. 133). This species, however, has hairs on the clypeus only, so it is placed in the *trapezifera* group, but I believe that the *puberula* and the *pilipennis* groups of entirely hairy species are actually related to the *trapezifera* group, as already stated (Vaurie, 1958, p. 349).

SECTION 2 OF SPECIES GROUP *trapezifera*

The five species (*superflua*, *catarinas*, *glabrimargo*, *saltensis*, and *dissona*) that occur exclusively in the northwestern states of Chi-

huahua and Durango (and one species each also in Sonora and Nayarit), are so similar in many ways that they are compared together. They all have very shining elytra with large deep punctures and distinctly convex, shining inner costae with very few punctures, and the front of the head concave. The first three have also the same type of clypeus with nearly truncate front edge and tiny acute front angles; the others do not have the clypeus dentiform. Each species is compared with *superflua*.

Diplotaxis superflua Vaurie, new species

Figures 125, 160

TYPE MATERIAL: Type, male, Palos Colorado, Durango, Mexico, 8000 feet, August 5, 1947, David Rockefeller expedition, C. Michener, collector, and two male and two female paratypes in the American Museum of Natural History. In the same institution are also eight male paratypes from Durango: five from 6 miles northeast of El Salto, 8500 feet, August 10, 1947, and three from Coyotes, 8300 feet, August 8, 1947.

RANGE: States of Durango, Chihuahua, and Nayarit, northwestern Mexico. In addition to the paratypes, 22 specimens have been examined: *Chihuahua*: San Jose Babicora, July 5, 1947, five; 5 miles south of Terrero, August 30, 1950, one. *Durango*: Encino, 6200 feet, July 27, 1947, four; also four females from El Salto and six females from Coyotes with the same data as the male paratypes from those localities. *Nayarit*: Three miles southeast of Mirador, June 26, 1954, A. A. Alcorn, collector, two males.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short; second interval of elytra unipunctate; pronotum with sides scarcely arcuate, front angles right, hind angles obtuse; head concave in front, convex behind.

Length, 7 mm. Color tawny. Head in profile descending almost perpendicularly to clypeus, front with round depression, finely, somewhat sparsely punctured. Clypeal suture sinuate at middle. Clypeus hairy, longer than one-half of the length of head, punctures larger and denser than those on head, front margin narrowly, weakly reflexed, virtually truncate between tiny but distinct and acute

dentiform angles, sides slightly sinuate, converging obliquely to front. Eyes not sunk, large, each eye one-quarter of the width of head. Palpi with last segment not impressed at base. Labrum sunk at middle, prominent at sides, densely punctured, level in front with, and no longer than, the reflexed under side of clypeus, front margin nearly straight. Mentum virtually flat, with only a faint pubescent line indicating the anterior declivity.

Pronotum rather flat, transverse, punctures larger than those on head, sparser and irregular on disc, dense on sides; an impunctate longitudinal space at middle base; sides widest behind middle, but scarcely arcuate, hind angles vaguely depressed within, base rather convex and impunctate. Elytra three times longer than pronotum, punctures larger and denser than those on pronotum; punctures of second interval as large as those on striae; costae convex, shining, distinct, with some punctures widely separated by four or five striae punctures; marginal hairs shorter than width of a sutural interval. Metasternum twice as long at middle as hind femora are wide. Pygidium with dense rugose punctures as large as those on sides of abdomen.

Front tibiae with third tooth small and placed well in front of middle. Middle tarsi with first two segments about equal in length, hind tarsi with first distinctly shorter than second segment; hind tarsi longer than hind tibiae. Genitalia as in figures 125 and 160; basal piece only one-half of the length of lobes.

SEXUAL DIMORPHISM: As in *denticeps*, except that the hind tibial spurs and first hind tarsal segment of the male are somewhat longer and narrower than in the female.

VARIATIONS FROM TYPE: The size varies from 6.5 to 8 mm. The front margin of the clypeus may be slightly emarginate. In most of the specimens the impunctate space on the pronotum is longer than in the type. Two or three individuals have some double punctures on the second interval of the elytra. The head in front is not always noticeably impressed; the eyes may be wider apart, one-fifth instead of one-fourth of the width of the head.

REMARKS: This species occurs in two of the same states as the two that follow (*catarinas*, *glabrimargo*) and in some of the same localities as *glabrimargo* (Palos Colorados, El Salto,

and Encino in Durango). These three species are very similar. They have the same kind of clypeus with tiny acute angles in front, the same nearly straight-sided pronotum (more arcuate in *glabrimargo*), with rather coarse, sparse, deep punctures, the front margin of the labrum straight and its center concave, and the same shining elytra with large punctures and short marginal hairs. The male genitalia, however, are distinctly different in all (figs. 123, 125, 129), and there are other differences as well (see *catarinas* for further comparison; *superflua* differs from it by having a tawny, not black, head). The differences between *superflua* and *glabrimargo* are the larger size of *superflua*, its reddish, not blackish, color, larger eyes, more densely punctured pygidium, rather depressed, not convex, pronotal sides (at base in front of the hind angles), and the usually more sinuate, not so straight, sides of the clypeus. The setose carinae on the hind tibiae appear to be much less prominent in *superflua* than in *glabrimargo* and not to extend across the face of the tibiae. (See *saltensis* for comparison with that species.)

Another species very similar in the head and clypeus and general shape is *pilipennis* Moser from the same area of Mexico, but this is one of the dorsally hairy species and has also long marginal hairs.

At $\times 36$ magnification, tiny hairs can be seen emanating from the punctures at the sides of the elytra, as is true also in *catarinas* and *dissona*.

***Diplotaxis catarinas* Vaurie and Cazier**

Figures 123, 158

Diplotaxis catarinas VAURIE AND CAZIER, 1955, p. 20, figs. 2G, 3C (Catarinas, Chihuahua, Mexico; type, male, in the American Museum of Natural History).

RANGE: States of Chihuahua and Durango in northwestern Mexico: *Chihuahua*: Catarinas, 255 specimens (including the type); Huejotitlan, two; Cañon Prieto, two. *Durango*: Encino, nine.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra sparse, short; second interval of elytra irregularly unipunctate; pronotum with sides slightly arcuate, front angles right but ap-

pearing somewhat acute, hind angles obtuse; head concave in front, convex behind.

Length, 5.5 to 7.5 mm. Color tawny or red, head usually black. Head in profile descending abruptly to clypeus, steeply declivous in front, the declivity broadly transversely impressed in such a way that front of head is made convex and bulbous above it; punctures rather dense. Clypeus and suture as in *superflua*, except that front margin usually has a small sinuation (sometimes tooth-like) at middle. Eyes sunk, otherwise as in *superflua*. Labrum and mentum as in *superflua*, except that labrum is deeply sunk in entire center part and front margin is below level of, and is longer than, reflexed under side of clypeus.

Pronotum, elytra, metasternum, and pygidium as in *superflua*.

Front tibiae and middle tarsi as in *superflua*, hind tarsi with first segment only slightly shorter than second. Genitalia as in figures 123 and 158; basal piece about one-half of the length of lobes.

SEXUAL DIMORPHISM: As in *superflua*.

REMARKS: The projecting sinuation of the clypeus between the tiny acute front angles (present in 90% of the specimens examined), the convex bump on the front of the head formed by the deep frontal depression, the peculiar sunken labrum (sunk in front as well as behind), and the kind of male genitalia (figs. 123, 158) form a combination of characters that set this species off from all the others. It is otherwise very similar to both *glabrimargo* and *superflua*, but differs further from *glabrimargo* by having the eyes larger and rather sunken, the pygidium usually more densely punctured, and the color pale, not appearing black as in that species. (See *superflua* for further comparison.)

Diplotaxis glabrimargo Vaurie and Cazier

Figures 129, 160

Diplotaxis glabrimargo VAURIE AND CAZIER, 1955, p. 22, figs. 2F, 3C (Palos Colorados, Durango, Mexico; type, male, in the American Museum of Natural History).

RANGE: States of Chihuahua and Durango in northwestern Mexico. A total of 159 specimens has been examined, as follows: *Chihuahua*: Catarinas, 13; Salaices, 51. *Durango*: Palos Colorados, 92 (including the type); Du-

rango, one female; Encino, one female; 5 miles northeast of El Salto, one female.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra seldom visible; second interval of elytra irregularly unipunctate or confusedly multipunctate; pronotum with sides gently arcuate, front angles right, hind angles obtuse; head concave.

Length, 5 to 7.5 mm. Color dark red to black, head often black. Head as in *superflua*, punctures sparse or dense. Clypeus as in *superflua*. Eyes not sunk, each eye about one-fifth of the width of head. Labrum and mentum as in *superflua*, except that labrum is more concave.

Pronotum and elytra as in *superflua*, except that hind angles of pronotum are not impressed within but rather convex, and elytra may have double rows of punctures on the second interval and the margins often glabrous. Metasternum as in *superflua*. Pygidium with large but rather sparse punctures.

Front tibiae and middle and hind tarsi as in *superflua*, except that hind tarsi are no longer than tibiae. Male genitalia as in figures 129 and 160; basal piece about one-half of the length of lobes.

SEXUAL DIMORPHISM: As in *superflua*.

REMARKS: This species differs from the quite similar *catarinas* and from most other species in the group by having the marginal hairs of the elytra so sparse and small that generally they are not even visible. It differs further from *catarinas* and *superflua* by having the punctures of the pygidium sparse, the eyes smaller, and the color usually black or very dark red.

Diplotaxis saltensis Vaurie, new species

Figures 126, 161

TYPE MATERIAL: Type, male, "J. Manuel, 9300 feet, El Salto, Durango, Mexico," June 5, 1937, and 14 male paratopotypes in the American Museum of Natural History. [J. Manuel may be a hamlet near El Salto.]

RANGE: State of Durango in northwestern Mexico and (possibly) Hidalgo in the southeast. In addition to the paratypes, specimens have been examined from the following localities. *Durango*: J. Manuel, El Salto, June 5, 1937, 22; San Antonio, El Salto, 5000 feet,

June 10, 1937, 24. *Hidalgo*: Ajacuba [not located], 8000 feet, June 21, 1937, two females.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short to medium¹; second interval of elytra unipunctate, with punctures as large as those of striae; pronotum with sides not strongly arcuate, front angles somewhat acute but small, hind angles obtuse; head concave.

Length, 7 mm. Color light red. Head gently sloping to clypeus, with large shallow concavity at center, finely, sparsely punctured. Clypeal suture obliterated. Clypeus hairy, one-half of the length of head, punctures larger and denser than those on head, front margin strongly reflexed and sharply emarginate between acute dentiform angles; sides not sinuate, converging obliquely to front from sharp angles in front of eye. Eyes, palpi, and mentum as in *superflua*. Labrum slightly concave, distinctly shorter than reflexed under side of clypeus, punctured faintly.

Pronotum as in *superflua*. Elytra as in *superflua*, except that punctures of second interval are slightly confused apically, and marginal hairs are a little longer than width of one sutural interval. Metasternum, hind coxal plate, and pygidium as in *superflua*, except that pygidium is more convex and rather bumpy.

Front tibiae and middle and hind tarsi as in *superflua*. Genitalia as in figures 126 and 161; basal piece distinctly shorter than lobes.

SEXUAL DIMORPHISM: As in *superflua*.

VARIATIONS FROM TYPE: The length ranges from 7 to 8 mm. The depression on the front of the head may be more or less prominent than in the type; the angles of the clypeus may be blunt and less emarginate (usually females); the sides of the pronotum are more curved in some individuals, and the front angles are right, not acute. The punctures of the pygidium are not always rugose. The marginal hairs of the elytra may be as long as the scutellum, although they are evidently worn in the majority of specimens.

REMARKS: In its excavated head and acutely angled, emarginate clypeus this species resembles *megapleura* (see fig. 11), which occurs in the same localities of Durango, as

well as elsewhere, but *saltensis* differs by having the pronotum short, the sides scarcely curved, not at all bulging, the hind angles distinct, not rounded off, the marginal hairs of the elytra only one-half of the length of those of the other species, the reflexed elytral margins not widened apically, and the male genitalia more elongate, and sinuous in profile.

The elytra and pronotum are similar to those of *catarinas*, *superflua*, and *glabrimargo*, but the labrum, although short and slightly concave behind, is level in front in *saltensis*, not hollowed out or pushed in as in the other species, and the marginal hairs are long. (See *dissona* for comparison with that species.)

It is possible that this species occurs in both Durango and Hidalgo, but according to the distribution of members of the genus it does not seem probable, and I wonder if the two Hidalgo specimens may not have been labeled in error. Additional material may show whether or not the intervening area is occupied by this species. The localities in Durango are close to each other. The name "El Salto" appears on all the labels in addition to one of the other two names (J. Manuel and San Antonio), although there is a San Antonio slightly north of the city of Durango, whereas El Salto is southwest of that city. No "J. Manuel" could be found; this may be the name of the collector, but it is doubtful.

***Diploaxis dissona* Vaurie, new species**

Figure 128

TYPE MATERIAL: Type, male, 8 miles west of Matachic, Chihuahua, Mexico, 6400 feet, July 8, 1947, David Rockefeller expedition, H. Spieth, collector, and three paratypes from the same expedition (one female with the same data as the type, one male from 2 miles west of Matachic, July 7, 1947, W. J. Gertsch, collector, and one male from Namiquipa district, Chihuahua, 6500 feet, July 3, 1947, M. Cazier, collector); type and paratypes in the American Museum of Natural History.

RANGE: Chihuahua and Sonora in northwestern Mexico. Two additional males have been examined from Rio Mayo, Sonora (south of Guaymas), July, one collected by H. Gentry at "Bakashaba, Rio Mayo."

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of

¹ Long in some other specimens.

elytra unipunctate; pronotum with sides strongly arcuate behind middle, front angles right, hind angles obtuse; head concave in front.

Length, 6.5 mm. Color tawny. Head and clypeus as in *superflua*, except that front margin of clypeus is slightly emarginate between blunt obtuse angles. Clypeal suture obliterated at middle. Eyes, palpi, labrum, and mentum as in *superflua*, except that eyes are even larger, each eye almost one-third of the width of head.

Pronotum rather flat, punctures of disc sparser than and twice as large as those on head, somewhat denser on sides, sides widest behind middle, base convex and impunctate. Elytra as in *superflua*, except that the marginal hairs are as long as scutellum, and one of the inner costae is impunctate in half of its length. Metasternum and pygidium as in *superflua*.

Front tibiae and hind tarsi¹ as in *superflua*, except that first segment of hind tarsi is only slightly shorter than second. Genitalia much as in figure 128 of *chiricahuae*; basal piece about same length as lobes.

SEXUAL DIMORPHISM: The type and other males are distinguishable from the female (dissected) only by the slightly more transverse pygidium and slightly narrower hind femora, which are relative characters. The hind apical tibial spurs and the flare of the tibiae, abdomen, clypeal angles, and eyes, which often present secondary sexual differences in the genus, appear to be the same in both sexes.

VARIATIONS FROM TYPE: The length ranges from 6.5 to 7 mm. The angles of the clypeus may be a little sharp in some specimens and in the paratype from Namiquipa are broadly rounded (worn?). One of the paratypes from Matachic has the front of the head flattened but scarcely visibly concave. The punctuation of the costae of the elytra is erratic and variable even on the same individual, but the punctures are always spaced widely.

REMARKS: This species has very long marginal hairs on the elytra in contrast to three of the other species in this section (*superflua*, *catarinas*, and *glabrimargo*), which have very

short hairs. It differs further from these three by having an angulate, not dentiform, clypeus. The clypeus and marginal hairs are more as in the fourth species (*saltensis*), from which *dissona* differs not only in its straight, not sinuate, male genitalia, but also by having the sides of the pronotum more angulate, not nearly straight, the front angles right, not acute, the hind angles not depressed within, and the labrum more concave, not so flat.

This species not only closely resembles the four preceding species but has similarities also with other species of the group. It is not the same, however, as *chiricahuae* Fall, although the male genitalia are similar, for the head is depressed in front instead of convex, the pronotum and elytra have large, coarse punctures, and the elytral costae have fewer punctures (in *chiricahuae* there are at least a dozen punctures on the costae). It is not *consentanea* Bates nor *sonora*, new species, because of the genitalia and the long marginal hairs; it is not *latispina*, although the genitalia are similar, because it does not have very fine dense punctuation covering the dorsal surface as in that species. A different species with different genitalia, but which might be difficult to separate from *dissona* by the description, is *megapleura*, a more southern species that extends north into Durango and Sonora; in general this species has the sides of the clypeus more emarginate than are those of *dissona*, the pronotum proportionately less transverse, larger and longer, with the front angles rather acute or drawn forward, and the punctuation not coarse; the front tibiae usually have no third tooth.

As in *superflua* and *catarinas*, the elytra of *dissona* have minute hairs on the lateral rows that can be seen at $\times 36$ magnification.

SECTION 3 OF SPECIES GROUP *trapezifera*:

ENDEMIC SPECIES OF BAJA CALIFORNIA

In this section are included the following species of the *trapezifera* group, all of which are endemic to Baja California: *polita* Fall; *parpolita*, new species; *mascula*, new species; *flexa*, new species; *confusa* Fall; and *academia*, new species. The species are compared with *polita*.

There are eight or nine other species of other groups that occur in Baja California, four of which are endemic (*punctulata*, *anthra-*

¹ The middle tarsi are missing in the type; they have the first two segments about equal in length in other specimens.

cina, and two new species), but these are treated elsewhere.

Almost all the material examined in this section belongs to the California Academy of Sciences. From this fine collection, I have examined 300 and 400 specimens of *confusa* and *academia*, respectively, but only 30, or far fewer, of the other four species.

***Diplotaxis polita* Fall**

Figures 44, 146, 147

Diplotaxis polita FALL, 1909, p. 83, pl. 1, fig. 48 ("Lower California," [Mexico]; type locality here restricted to the Cape region; type, female, in the Museum of Comparative Zoölogy).

RANGE: Cape region of Baja California, Mexico. I have seen 33 specimens from Triunfo, July 13, 1938; one male and one female from Las Animas in the Sierra Laguna, October 12, 1941, and the type, a female, from "Lower California." There are other places called "Las Animas" in various parts of the peninsula, but the Sierra Laguna range is near the southern tip (fig. 44).

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra short; second interval of elytra multipunctate at middle; sides of pronotum strongly arcuate, but not bulging, front angles acute, hind angles obtuse, distinct; head with slight frown in front.

Length, 7 to 8.5 mm. Color, head usually black, remainder dark red, often with black infuscations. Head densely punctured, rounded to the hairy clypeus which is as long as one-half of the length of head (in some specimens longer); front margin of clypeus strongly reflexed and slightly or strongly emarginate between the blunt obtuse angles (male) or broadly rounded angles (female); side margins less reflexed and scarcely sinuate; punctures larger than those on head, often rugose, surface not tumid. Eyes not sunk, each eye about one-quarter of the width of front of head. Maxillary palpi with base of last segment somewhat flattened, not depressed. Labrum flat, at least in front where it is level with, and as long as, the reflexed under side of clypeus, slightly concave behind, finely or strongly punctured. Mentum with well-marked declivity in anterior third, the posterior margin ridged and pubescent.

Pronotum with punctures of about the same size as those on head, but sparser, sides widest at or slightly behind middle, thence gently curved to front and rear. Elytra about three times longer than pronotum, punctures somewhat larger, punctures of second interval in some specimens in single row in front; costae flat or convex; marginal hairs not or scarcely longer than width of one sutural interval. Hind coxal plate as in group. Metasternum not quite twice as long as hind femora are wide (latter are very wide). Pygidium not large, punctures dense, rather rugose.

Front tibiae narrow, straight on inner side, with long apical projection, the outer teeth shallowly cut, the spur short, basal tooth placed about at middle but may be nearly obsolete. Middle tarsi with first two segments about equal in length, hind tarsi with first segment one-third shorter than second. Male genitalia as in figures 146 and 147; basal piece longer than lobes.

SEXUAL DIMORPHISM: Very weak; the only differences discernible between the sexes are that the clypeal front angles are more rounded in the female, sharper in the male, and the first hind tarsal segment seems shorter in the female. The hind tibiae are flared out apically, and the hind femora are quite wide in both sexes.

REMARKS: This species is so similar to the two that follow (*parpolita*, *mascula*) that the few key characters given at the beginning of each species description are the same in all. These three species are also sympatric, being restricted to the Cape region of Baja California, but the lateral lobes of the male genitalia differ so widely (figs. 148, 150) that they must be considered separate species. Conceivably, when more specimens are available, *parpolita* may prove to be the same as *polita* (although the male lateral lobes of a specimen 7 mm. long are nearly twice the size of the lobes of a male *polita* of similar or even slightly larger size, and are shaped somewhat differently), but the lobes of *mascula* are of quite another type, being extremely sinuous before the apex from both a dorsal and a lateral view. The clypeus of the male of *mascula* is more emarginate and has sharper angles than does that of *polita* or of *parpolita*. Fall says (1909) that he found greater variation in the

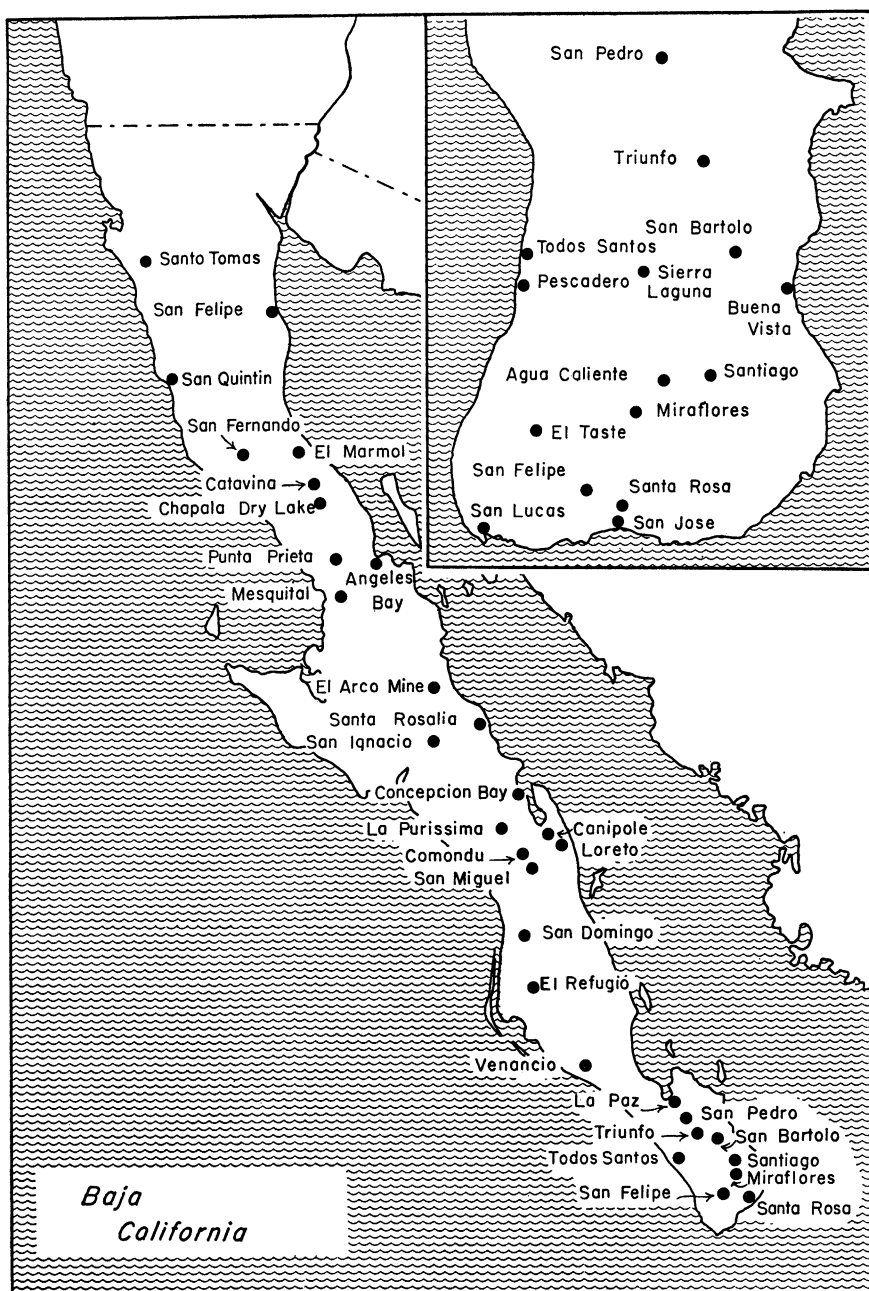


FIG. 44. Localities in Baja California, Mexico, where 15 species of *Diplotaxis* have been taken (for the species, see table 1).

clypeal margin in *polita* than in any other species. He suspected that the difference was sexual and he was correct, as shown by the present series of 33 specimens from Triunfo, of which nine males were dissected. The males have the clypeal angles somewhat more prom-

inent. The females from Triunfo I assume belong with these males, but four other females that I have examined cannot with certainty be relegated to any of the three species (one is from San Jose del Cabo, one from Todos Santos, one from 5 miles south of Miraflores, one

from "L. Cal."). Because males are so similar among these species, it is probable that the females also are similar.

Superficially, *polita* resembles *confusa* Fall (from throughout Baja California); even Fall confused his two species, because one of his "*polita*" specimens at the Museum of Comparative Zoölogy is actually *confusa*. The two species differ, however, in a number of characters (but *confusa* is quite variable): *polita* has short, not long, marginal hairs, much more marked declivity on the mentum, acute, not right-angled, front angles on the pronotum, no large depressions on the sides of the pronotum, a convex, not concave head, proportionately shorter tarsi, and different male genitalia. Fall (1909, p. 84) speaks of the crenulation at the base of the claws in this species and in his *chiricahuæ*, but this seems to me to be just the effect of light on the striation of the claws.

Although Fall's revision of 1909 concerned species from the United States, it included *polita* and *confusa* from Baja California as well as some species in other groups from that part of Mexico. All the specimens examined by Fall from Baja California were collected by Beyer in 1901.

***Diplotaxis parpolita* Vaurie, new species**

Figures 44, 150, 156

TYPE MATERIAL: Type, male, Todos Santos, Baja California, Mexico, October 10, 1941, Ross and Bohart, collectors, in the California Academy of Sciences. Two male paratypes in the American Museum of Natural History are from San Jose del Cabo (R. Hoping collection), and from Santa Rosa.

RANGE: Cape region of Baja California (fig. 44).

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short; second interval of elytra multipunctate at middle; sides of pronotum strongly arcuate, but not bulging, front angles acute, hind angles obtuse, distinct; head with slight frown in front.

Length, 7 mm. Color dark red, but top of head and elytra somewhat blackened. Head, eyes, and palpi as in *polita*. Clypeus sparsely hairy, as long as one-half of the length of head, its front margin strongly reflexed and strongly emarginate between the blunt obtuse

angles, sides somewhat indented in front of eyes, punctures sparser and slightly larger than those on head, surface flat, not tumid. Labrum as in *polita*, but finely punctured. Mentum as in *polita*.

Pronotum as in *polita*, but sides widest at middle. Elytra as in *polita*, but some punctures confluent and costae convex. Hind coxal plate as in group. Metasternum, pygidium, and middle tarsi as in *polita*.

Front tibiae as in *polita*, but basal tooth small, placed at about middle. Hind tarsi missing, but those of paratypes as in *polita*. Genitalia as in figures 150 and 156; basal piece about the same length as lobes.

SEXUAL DIMORPHISM: The female has not been recognized. In the male (type) the first hind tarsal segment is the same length as the longer of the tibial spurs, and the hind tibiae and femora are as given for *polita*.

VARIATIONS FROM TYPE: One of the paratypes is 8 mm. in length. The male from San Jose del Cabo has the angles of the clypeus more prominent than in the type, but not dentiform as in *mascula*. As is true also for *polita*, the second interval of the elytra may be unipunctate in front. The front of the head has scarcely any frown in the paratypes.

REMARKS: This species is almost exactly similar externally to *polita* Fall, also from the Cape region, but the male genitalia have large, wide lobes that are proportionately much larger than those of *polita*, almost twice larger, and the shape of the eighth sternite differs (figs. 146, 150). All three males were dissected.

A female from Todos Santos, October, 1923, and two females from San Jose del Cabo may be the females of this species, but they may also be the females of one of the other similar species (*polita*, *mascula*).

***Diplotaxis mascula* Vaurie, new species**

Figures 44, 143, 148

TYPE MATERIAL: Type, male, 5 miles south of Miraflores, Baja California, Mexico, July 10, 1938, Michelbacher and Ross, collectors, in the California Academy of Sciences. Paratypes: One male with same data as type; one male from Santa Rosa (Schaeffer and R. C. Casselberry collections); one male from Todos Santos, October 10, 1941 (Ross and Bohart); one male from 6 miles north of Tri-

unfo, July 15, 1938 (Michelbacher and Ross), all localities in Baja California. Two of the paratypes are in the American Museum of Natural History; two, in the California Academy of Sciences.

RANGE: Cape region of Baja California (fig. 44).

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short; second interval of elytra multipunctate at middle; sides of pronotum strongly arcuate, but not bulging, front angles acute, hind angles obtuse, distinct; head with slight frown in front.

Length, 7 mm. Color dark red, head and center of pronotum and elytra infuscate. Head, eyes, and palpi as in *polita*. Clypeus sparsely hairy, longer than one-half of the length of head, broadly concave, front margin very strongly reflexed and strongly emarginate between prominent but blunt dentiform angles, sides scarcely reflexed, somewhat indented in front of eyes, punctures larger than those on head, rugose, surface not entirely flat, but not tumid. Labrum as in *polita* but finely punctured. Mentum as in *polita*.

Pronotum as in *polita*, but sides widest at middle. Elytra as in *polita* but not quite three times longer than pronotum, and some punctures confluent and costae convex. Hind coxal plate as in group. Metasternum about twice longer than hind femora are wide. Pygidium as in *polita*.

Front tibiae as in *polita* but basal tooth small, placed a little in front of middle. Middle and hind tarsi as in *polita*. Genitalia as in figures 143 and 148; basal piece longer than the lobes.

SEXUAL DIMORPHISM: Female not known. The male has the hind tibiae flared apically as in *polita* and the first hind tarsal segment and spur of the same length.

VARIATIONS FROM TYPE: One paratype is 7.5 mm. The labrum is strongly punctured in one specimen. The paratype from Todos Santos has the second interval of the elytra unipunctate in front and the pronotum more sparsely punctured. All three paratypes have the basal tooth of the front tibiae nearer the middle, but inconspicuous and somewhat obsolete.

REMARKS: Although this species is so similar to the two preceding ones (*polita* and *par-*

polita) that it could readily be assumed to be either of them, it has quite a different kind of male organ, in which the lateral lobes are wavy or sinuate in outline and taper to the apex (figs. 143, 148), and the apices tip backward before they turn downward (four of the five males were dissected). The clypeus of this species is slightly more exaggerated than that of either of the two preceding species, the margins being more indented, but the clypeus is less extreme in shape than that of the following species (*flexa*), from which it differs also in respect to the genitalia of the male as well as in other characters (see *flexa*).

This species comes from some of the same localities as *parpolita* (Todos Santos, Santa Rosa) and *polita* (Triunfo). I have seen a female from Todos Santos (in the United States National Museum) and from the type locality, Miraflores (in the California Academy of Sciences), but without a series I hesitate to identify these females as *mascula*, for they may be either *polita* or *parpolita*.

Diplotaxis flexa Vaurie, new species

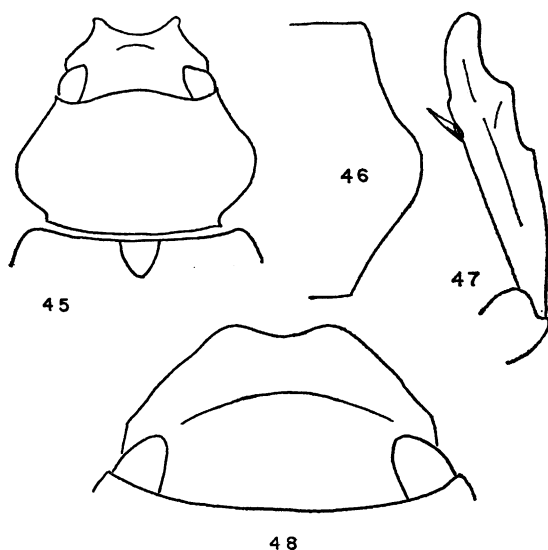
Figures 44, 45, 47, 48, 149, 160

TYPE MATERIAL: Type, male, 5 miles west of San Bartolo, Baja California, Mexico, July 13, 1938, Michelbacher and Ross, collectors, in the California Academy of Sciences. Paratypes: Three males and five females with same data as type, and three males and four females from Las Animas, Sierra Laguna, October 12, 1941 (Ross and Bohart), all from the Cape region of Baja California. Some paratypes in the collection of the American Museum of Natural History, others in the California Academy of Sciences.

RANGE: Cape region of Baja California (fig. 44).

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short to medium; second interval of elytra multipunctate throughout; sides of pronotum strongly bulging, strongly constricted to obliterated hind angles, front angles acute; head with dense rugose punctures but no frown.

Length, 8.5 mm. Color light brownish red. Head rounded to clypeus, not swollen in front, and front exceedingly densely confluent punctured, especially so near the clypeal suture. Clypeus hairy, almost as long as



FIGS. 45-48. Body parts of two species of *Diploptaxis* from Baja California. 45. Head and pronotum of male of *D. flexa*. 46. Pronotal outline of *D. confusa*. 47. Right front tibia of *D. flexa*. 48. Head of female of *D. flexa*, showing rounded clypeal angles.

head, front margin very strongly reflexed and drawn backward, especially at middle where it is strongly emarginate (fig. 45) between the bluntly dentiform angles; sides less reflexed, sinuate, punctures larger, even more rugose than on head, surface concave, not tumid. Eyes, palpi, labrum, and mentum as in *polita*, but labrum a little longer than reflexed under side of clypeus, finely punctured.

Pronotum with strongly bulging sides that are cut back and seemingly rolled under at the obliterated hind angles, punctures as in *polita*. Elytra with costae rather flat, otherwise as in *polita* except that marginal hairs of elytra are slightly longer than width of one sutural interval. Hind coxal plate margined laterally and bluntly angulate at base, the angle extending on to the reflexed elytral margin. Metasternum and pygidium as in *polita*.

Front tibiae as in *polita*, but basal tooth small, ill defined, placed a little in front of middle (fig. 47). Middle and hind tarsi as in *polita*. Genitalia as in figures 149 and 160; basal piece same length as lobes.

SEXUAL DIMORPHISM: The type and other males differ notably from females by having the clypeus more reflexed, more pulled back

at the middle, more emarginate, and the angles more prominent and sharper (figs. 45, 48). The femora, tibiae, spurs, and fifth abdominal segment show no marked differences between the sexes; the pygidium, however, is more transverse in the male.

VARIATIONS FROM TYPE: The size ranges from 8 to 10 mm. in length. With the exception of one large female from San Bartolo, all the larger specimens are from Las Animas. The head is often blackened. One of the male paratypes from San Bartolo has the head protruded, and this exposed part is sparsely punctured. The labrum in some specimens is shorter than the reflexed underside of the clypeus or even of the same length. In some specimens the pronotal punctures are very sparse. The marginal hairs on the front part of the elytra may be as long as the scutellum is wide, but in general and on the rest of the margin they are scarcely longer than a sutural interval is wide.

REMARKS: This species has the clypeus strongly flexed inward (emarginate at middle), and upward (reflexed), and the sides of the pronotum at the basal angles also inflexed and deflexed. In other species in this section of the group the pronotum shows a distinct margin extending continuously around the sides and base, whereas in this species the margin appears to be interrupted at the basal angles because they are rolled under in such a way that, from a strictly dorsal view, the margined hind angles are hidden. One result of this deflection is that the sides of the pronotum seem more strongly constricted than in most species. In *confusa* Fall, however, the constriction is also quite abrupt, and the same tendency for the hind angles to be deflexed is present, though not to such a noticeable degree.

Diploptaxis flexa is the largest of the Baja California species of the *trapezifera* group (up to 10 mm.), although some individuals of *confusa* which reach 9 mm. in length are larger than the smallest individual of *flexa* (8 mm.). In spite of its large size, it has very small and thin genitalia in the male, which are not only actually small, but also small in proportion to those of *parpolita*, a smaller species (figs. 149, 150). Three of the seven males, including the type, were dissected. It is difficult to depict the sweep of the clypeus of the male (fig. 45)

because of foreshortening, but it is an extreme version of the clypeus of *mascula* and once seen is readily recognized a second time.

This species seems more like the three preceding than *confusa*. It differs from the latter in the same ways that *polita* differs from *confusa* (see end of discussion of *polita*).

***Diplotaxis confusa* Fall**

Figures 44, 46, 144, 145

Diplotaxis confusa FALL, 1909, p. 88, pl. 1, fig. 54 ("Lower California," the type is from Santa Rosa, Baja California; type, male, in the Museum of Comparative Zoölogy).

RANGE: Cape region of Baja California, Mexico, north to San Fernando in the northern quarter of the peninsula (fig. 44). A total of 380 specimens have been examined. (See Appendix for further data.)

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra long; second interval of elytra multipunctate at middle; sides of pronotum abruptly bulging, front angles right, not acute, hind angles obtuse (fig. 46); head slightly or deeply concave at middle.

Length, 6 to 9 mm. Color tawny. Head finely, densely punctured. Clypeus as long or nearly as long as head, in some specimens even longer if measured from middle of suture which often is deeply sinuate or bent backward; front edge slightly or strongly reflexed, either truncate or slightly emarginate between the obtuse angles which are rounded off in female, less blunt and often forming a blunt tooth in male, punctures usually a little larger than those on head; surface usually slightly tumid, either transversely in front of suture, or perpendicularly to suture at middle. Eyes and palpi as in *polita*. Labrum shallowly, uniformly concave, usually rather faintly punctured, same length as and level with reflexed under side of clypeus. Mentum rather flat, but declivity in anterior one-half or one-third usually has well-marked ridge and pubescence posteriorly.

Pronotum with punctures of same size as those on head but usually sparser, at least on disc, sides (fig. 46) widest at or behind middle, thence sinuate to front, and retracted strongly to base, often with sinuation before base; sides near front usually, but not always, broadly or deeply depressed, much more so

than the usual small depression present in *Diplotaxis*. Elytra not quite three times longer than pronotum, punctures of same size or larger and quite sparse; second interval in many specimens unipunctate in front half, instead of multipunctate, occasionally unipunctate throughout; costae flat or slightly convex, their punctures much smaller than those on striae on each side, and separated by diameter of one or two striae punctures; marginal hairs as long as or longer than scutellum. Metasternum about twice as long as hind femora are wide. Hind coxal plate round or slightly angulate laterally, margined, margin slightly elevated. Pygidium as in *polita*.

Front tibiae with basal tooth in front of middle, tibiae appearing slightly curved on inner side, not so straight as in preceding species. Middle tarsi with first two segments about equal in length; hind tarsi with them about equal in length and width (male), the first segment in female slightly shorter and stouter than second. Male genitalia as in figures 144 and 145; basal piece longer than lobes.

SEXUAL DIMORPHISM: Males have slightly larger eyes, sharper clypeal angles, more tumid clypeus, less apically widened hind tibiae, and more transverse pygidium than females. Also the longer of the hind tibial spurs is about the same length as the first tarsal segment in the male, but quite a bit longer than that in the female; it is, however, equally narrow in both sexes.

REMARKS: Unlike the four preceding species, this species is not confined to the Cape region but occurs quite far north on the peninsula. It has the same kind of abruptly bulging pronotal sides as *flexa*, but here the front angles of the pronotum are not actually acute and the hind angles, although greatly constricted, are not bent under so notably as in *flexa*. The clypeus lacks the V-shaped front indentation characteristic of *flexa*, but it is much longer than in *flexa* and often tumid at the center; the front of the head is usually deeply triangularly concave, not convex as in *flexa*. In these last two characters, *confusa* differs also from *polita*. The marginal hairs of the elytra are very long and abundant in *confusa*, not sparse and of medium length as in *academia*, or short and sparse as in *polita* and the other species of this section. The labrum is

somewhat more concave, less flat, than it is in the preceding four species; the mentum on the other hand is usually flat, with scarcely noticeable apical declivity. The hind femora and the tarsal segments are longer and thinner than in the preceding species, more as in *academia* (which follows). In the male the hind tarsi are longer than the hind tibiae by the length of the entire claw segment, and the first segment is about as long as the second (see *academia* for further comparisons). The margin of the hind coxal plate at the sides, when pulled away from the edge of the elytra, is seen to stand out sharply, as in *flexa* and *academia*; it is not level and flat, as in *polita* and the others.

The color, clypeus, head, and pronotum in *confusa* are so variable that isolated individuals might be confused either with *polita* or with *academia*. Both *flexa* and *academia* are tawny or reddish; *polita*, *parpolita*, and *mascula* are dark, appearing black to the naked eye; and *confusa* is mostly tawny, but in some specimens blackish. Many specimens from Comondu, for example, have the head and central third of the elytra, with the exception of the suture, infuscate. These specimens are slightly different from most specimens from other localities in that the male has the clypeus more indented in front and no large depressions on the middle sides of the pronotum. However, a male from San Fernando and one from Todos Santos also have the clypeus strongly emarginate, as in specimens from Comondu, and there are specimens from various localities with no pronotal depressions. When present, the large pronotal depressions or gashes are diagnostic and unmistakable; they occur elsewhere in the genus in *pacata* Fall. The sides of the pronotum are not always so strongly retracted at the base as is shown in figure 46. The clypeus and front of the head in some individuals resemble the general pattern present in *simplex* Blanchard, *parvula* Burmeister, and *consentanea* Bates (the last two are also in the *trapezifera* group).

Diplotaxis confusa, as well as *academia*, seems a very abundant species. I have seen large series of 40 or more specimens from Comondu, from San Domingo, from El Refugio, and other places. The four preceding species, on the other hand, which are restricted to the Cape region, are represented in all by but 60 specimens examined.

The genitalia, dissected from 10 males, are somewhat the same shape dorsally as those of *academia* and *polita*, but differ from them by having the apices blunt and truncate, not acuminate, and also not deflexed as in the species mentioned.

***Diplotaxis academia* Vaurie, new species**

Figures 44, 142, 143

TYPE MATERIAL: Type, male, 5 miles south of Miraflores, Baja California, Mexico, July 10, 1938, Michelbacher and Ross, collectors, in the California Academy of Sciences. Paratypes: Twenty-one males and four females, same data, some of which are in the collection of the American Museum of Natural History. The remainder are with the type.

RANGE: Mainly the Cape region of Baja California, but also north on the peninsula as far as San Quintin (fig. 44). About 450 specimens have been examined. (See Appendix for other localities.)

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra short (might be called of medium length); second interval of elytra unipunctate; sides of pronotum strongly arcuate, front angles acute, hind angles obtuse; head shallowly depressed in front.

Length, 5 mm. Color tawny. Head finely, densely punctured. Clypeus sparsely hairy, longer than one-half of the length of head, front margin strongly reflexed, distinctly emarginate between acute dentiform angles, sides slightly sinuate and bent inward, but not angularly, in front of eyes, punctures dense, larger than those on head; surface not tumid. Eyes as in *polita*. Maxillary palpi, last segment on one side with base depressed, on other side with it merely flattened. Labrum shallowly, uniformly concave, densely, strongly punctured, its front border scarcely arcuate; no longer than reflexed under side of clypeus. Mentum flat, its short apical declivity scarcely visible.

Pronotum with discal punctures of same size as those on head but sparse, less sparse on sides, sides widest behind middle, thence sinuate to front, and retracted to hind, angles; base at hind angles rather bulbous and impunctate. Elytra nearly three times longer than pronotum, punctures of same size and density as those on disc of pronotum, punctures shallow, those of second interval small, not filling

the interval; costae flat, their punctures minute and separated by the diameter of two striae punctures; marginal hairs scarcely longer than width of one sutural interval. Metasternum about twice as long as hind femora are wide. Hind coxal plate angulate laterally, margined, the angle in natural position extending over onto the elytral margin. Pygidium as in *polita*.

Front tibiae as in *polita*, but basal tooth small, inconspicuous, situated about at middle. Middle tarsi with first segment slightly longer than second, hind tarsi with it much shorter (scarcely one-half as long) and wider. Genitalia as in figures 142 and 143; basal piece longer than lobes.

SEXUAL DIMORPHISM: The type and other males have the clypeus more strongly indented in front than do the females, the front margin more reflexed, the lateral angles distinctly acute, not more or less rounded as in the female, the head usually depressed, not merely flattened. Males also have the pygidium more transverse, not so elongate, but the distinction is not always readily made. Males have the longer tibial spur somewhat narrower and the hind tibiae less flared apically than do the females.

VARIATIONS FROM TYPE: The size varies from 5 to 8 mm. long. The hairs on the clypeus are more abundant in some specimens. The clypeal suture, when visible, is usually sinuate at the middle. The surface of the clypeus is in some specimens slightly convex at the middle, as often occurs in *confusa*, and the sides are often angulate in front of the eyes. The mentum may show the declivity more clearly than does the type, and it is pubescent and slightly ridged behind. The depression of the last palpal segment varies considerably in depth and is not even present in some individuals. The retracted pronotal sides are often slightly sinuate before the hind angles. The costal punctures of the elytra are denser in some specimens than in the type; the marginal hairs in front may be almost as long as the scutellum, but usually at the middle they are only a trifle longer than one sutural interval is wide. The basal tooth of the front tibiae is slightly in front of the middle in some specimens.

REMARKS: This, one of the smallest species in the genus (with *misella*, *brevicornis*, *pumila*, *parvula*, *rufipes*), appears to be a relative of

confusa Fall, with which, in fact, it was evidently confused by Fall. He probably had specimens of *academia* for he says (1909, p. 89) in his discussion of *confusa*: "The specimens here referred are quite variable in two or three particulars . . . in the smallest specimens of the series before me, the punctuation is finer, and that of the second and third intercostal space is much more regular than in the typical form. In these also the mental declivity is completely obsolete, being defined only by the transverse row of setae." In addition to these characteristics, the elytral punctures in *academia* are sparse, fine, and shallow, and the second elytral interval is unipunctate, whereas in *confusa* and in the other species of this section the punctures are as a rule denser, coarser, deeper, and usually double in the second interval. In *academia* the pronotum has small, acute, front angles, not right angles as in *confusa*, and the sides of the pronotum are evenly arcuate, not abruptly bulging at the middle. The marginal hairs of the elytra are shorter than in *confusa*, and the lobes of the male genitalia are sinuate, not straight, and have pointed, not truncate apices (figs. 142-145). The first segment of the hind tarsi is proportionately shorter in this species than in *confusa* and the other species.

In spite of the many differences enumerated, the variation present in *confusa* is so great that some individuals tend to resemble *academia*. Thus I have a male of *confusa* from Todos Santos which lacks the marked depression usually present on the sides of the pronotum and on the front of the head. This specimen is small (6 mm.), as is *academia*, has the second interval of the elytra unipunctate in part, as has *academia*, and is of the same tawny color as *academia*. The marginal hairs of this specimen, however, are longer than in *academia*, the first segment of the hind tarsi is as long as the second, not one-half of its length as in *academia*, and the pronotum is shorter, its sides bulging at the middle (the front angle in this male is slightly acute as in *academia*).

The large eyes distinguish this species from the majority of the other very tiny species of the *trapezifera* group, none of which occurs in Baja California. The lateral lobes of the male genitalia are somewhat similar to those of *rufipes* Moser from Oaxaca, although less sinuous.

This must be a very abundant beetle at the Cape. I have seen nearly 200 specimens from the type locality, nearly the same number from Triunfo, and 49 from Las Animas in the Sierra Laguna. The other species in this section occur in one or more of the same localities as *academia*, and *confusa* has been taken in five of the same localities. Northward from the Cape, *academia* becomes less common, at least according to present material, only one or two examples having been collected from San Venancio, Canipole, San Miguel, Santa Rosalia, and Comondu. No specimens have been seen from the area between these localities in the southern district and the locality of San Quintin about midway of the northern district on the west coast.

The species is named in honor of the California Academy of Sciences which has done so much to make known the fauna of Baja California. It was recognized as being new in their material by Dr. Mont A. Cazier who marked it "n. sp. nr. *confusa*."

SECTION 4 OF SPECIES

GROUP *trapezifera*

In this section are assembled some similar species from southern Mexico (one species is from Durango) with small eyes (each eye from one-fifth to one-sixth of the width of the head) and small body size (except for *marina* which is from 8.5 to 10 mm.). The first four species are compared to *parvula*; the others, to *bifida*.

The species, in the order of their listing, are *parvula*, *sparsa*, *cribriceps*, *marina*, *durango*, *bifida*, *rufipes*, *iguala*, *corrosa*,¹ *aenea*,¹ and *clypeata*.¹

Diplotaxis parvula Burmeister

Figures 132, 152

Diplotaxis parvula BURMEISTER, 1855, p. 264 ("Mexico"; here restricted to the state of Oaxaca, southern Mexico; two syntypes in the Martin Luther Universität, Halle).

RANGE: Known only from the state of Oaxaca, Mexico. From Juquila I have seen five specimens; from Candelaria, July, 1956 (B. Rotger), one; and from "Mexico," seven, in-

cluding the two syntypes. Juquila is in the mountains near the coast, and Candelaria is in the east near the border of Chiapas.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra short; second interval of elytra unipunctate; pronotum with sides strongly angulate behind middle, angles obtuse; head depressed triangularly in front.

Length, 5.5 to 6.5 mm. Color black or reddish brown. Head sparsely, irregularly punctured, but more densely in front near the impression. Clypeal suture bent backward sinuately at middle. Clypeus trapezoid, hairy, more than one-half of length of head, punctures dense and confluent, larger than those on head and forming a slight ridge in front of suture; front margin truncate, scarcely reflexed, angles obtuse but blunt, sides oblique, not sinuate. Eyes not sunk, small, each eye one-fifth of width of head. Labrum flat, a little longer than and level with the reflexed under side of clypeus, densely punctured. Mentum with slight declivity in apical fourth or fifth that is posteriorly margined and pubescent.

Pronotum convex, transverse, punctures of same size as those on head, those on disc as sparse as those on head, but on sides denser, sides widest behind middle. Elytra three times longer than pronotum, punctures twice as large as and denser than those on pronotum, punctures of second interval as large as those on striae on each side; costae flat or slightly convex; marginal hairs as long as width of a sutural interval; suture crowded with punctures. Metasternum slightly depressed, one and one-half times as long as hind femora are wide. Pygidium small, irregularly and sparsely punctured.

Front tibiae with third tooth in front of middle. Middle tarsi with first segment longer than second, hind tarsi with it a little shorter than second. Hind femora narrow, straight, less than twice wider than hind tibiae. Hind tarsi about as long as hind tibiae. Male genitalia as in figures 132 and 152; basal piece shorter than lobes.

SEXUAL DIMORPHISM: It is difficult to separate the sexes. The male appears to have the pygidium more transverse. The hind tibial spurs are the same in both sexes.

REMARKS: In addition to the general diag-

¹ These three species were discussed in part 1 (Vaurie, 1958) as the *aenea* group, but they are now considered as belonging with the *trapezifera* group.

nosis given above, the characteristics of this small species are as follows: stout, apically widened elytra, an impression on the front of the head, straight-sided clypeus, usually with wrinkled surface, long antennal club, sparsely punctured pronotum and pygidium (including the propygidium), and usually a double row of crowded punctures on each sutural interval. The last character was mentioned by Bates (1887-1888, p. 162), and I have not noticed it in any other species of the *trapezifera* group except in a specimen tentatively identified as *nigriventris* Bates (Sinaloa) and in some specimens of *roberti* (southern and central Mexico), a small species but with large eyes. (See *sparsa* and *durango* for comparisons with those species.) The tarsi seem to be somewhat more hairy than those of most species, but the hairs are not thick enough to form pads.

The syntypes, labeled "Nob. Mexico," which I have examined through the kindness of Dr. J. O. Husing of the university at Halle, agree with the specimens at hand except that they have the front of the head more deeply impressed.

***Diplotaxis sparsa* Vaurie, new species**

Figures 36, 128

TYPE MATERIAL: Type, male, Acapulco, Guerrero, Mexico, January 16, 1948, M. Marquis, collector, in the California Academy of Sciences. Five male and four female paratypes from the same locality but different dates in January, 1948, in the same institution and in the American Museum of Natural History; one male paratype, Acapulco, July 1, 1951, P. D. Hurd, collector, in the University of California at Berkeley.

RANGE: Pacific coast of Mexico from Sinaloa south to Guerrero, also the Tres Mariás archipelago off the coast of Nayarit. (For data on the 16 additional specimens examined, see Appendix.)

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra irregularly unipunctate; pronotum with sides strongly angulate behind middle, front angles sharply obtuse, hind angles rounded off; head without frown.

Length, 7.5 mm. Color dark red. Head descending abruptly to clypeal suture which is

sinuate or bent backward at middle, front slightly flattened, punctures not touching. Clypeus sparsely hairy, more than one-half of the length of head, punctures larger and denser than those on head, front margin not quite rounded from side to side but virtually truncate and scarcely reflexed between broadly rounded angles, sides not sinuate (fig. 36). Palpi with last segment flattened basally. Eyes, labrum, and mentum as in *parvula*.

Pronotum convex, disc and sides with slightly larger punctures than those on head, but very sparse, some punctures separated by twice their diameter, sides widest behind middle, base not impressed. Elytra as in *parvula*, except that marginal hairs are as long as width of scutellum, and suture has single row of punctures. Metasternum as in *parvula*. Pygidium quite convex, sparsely punctured with only seven or eight punctures.

Front tibiae and middle and hind tarsi as in *parvula*, except that hind tarsi are no longer than hind tibiae. Hind femora somewhat bulbous, more than twice as wide as hind tibiae. Genitalia as in figure 128 of *chiricahuae*, but stouter than shown for that species and the apices not turned downward; basal piece about same length as lobes.

SEXUAL DIMORPHISM: The type and other males have the hind femora and the hind tibial spurs a little narrower and the hind tibiae less flared out apically than females, but the sexes are difficult to separate. The males have quite long hairs on the tarsi, but not so thick as to form pads.

VARIATIONS FROM TYPE: The length varies from 7 to 8 mm. About a third of the specimens examined are black or partially black instead of red or tawny. In some specimens the head is more densely punctured than in the type; in some the pronotum has a space at the center but it is not elevated as it is in *cribriceps*; in one the pronotum is quite densely punctured. The elytra in some examples are less than three times the length of the pronotum. One of the paratypes has only four punctures on the pygidium. The third tooth of the front tibiae is almost median in some specimens.

REMARKS: In spite of its sparse punctuation, this species might at first glance be mistaken for *cribriceps* Bates which it resembles in the form of the head, clypeus, pronotum,

and elytra; on the other hand, just because of its sparse punctuation it might be mistaken for *parvula* Burmeister. All three species are rather convex in appearance, with the elytra widened behind; and this shape and the short metasternum might cause one to think that the wings were abbreviated or reduced, but they are normally long in the individuals examined. *Diplotaxis sparsa* differs from the other two species by having longer marginal hairs (as long as the scutellum in fresh specimens), and different male genitalia (see figs. 128, 130, 132). It differs further from *parvula* (Oaxaca) by having a less angulate clypeus, with a smooth, not rugose or elevated, surface, the head not triangularly impressed in front, and only one row, not two or three rows, of punctures on the suture of the elytra. It differs further from *cribriceps* by having sparse and fine, not dense and coarse, punctuation on the pronotum and pygidium, and less dense punctures on the head, by being more often reddish or pale than black, and by lacking the deep basal impression and raised impunctate space of the pronotum. Both *sparsa* and *cribriceps* occur in Colima, but *sparsa* is only coastal so far as is known, whereas *cribriceps* inhabits inland localities also (Oaxaca, Morelos, Guerrero). (For comparison with *yucateca*, see that species.)

The male genitalia are like those of some *chiricahuae* from farther north; they are also similar to those of *cribraticollis* and *latispina*, both densely punctured species.

***Diplotaxis cribriceps* Bates**

Figures 130, 155

Diplotaxis cribriceps BATES, 1889, p. 398 (type locality not designated; the type, male, is from Tepetlapa, Guerrero [=Oaxaca], Mexico, in the British Museum).

RANGE: Southern Mexico, including western Oaxaca, Morelos, and northern Guerrero, also Colima farther north on the Pacific coast. (See Appendix for further data on the 36 specimens examined.)

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra short; second interval of elytra multipunctate (type) but usually irregularly unipunctate; pronotum with sides very strongly angulate behind middle, front angles right, hind angles obtuse; head without frown.

Length, 7 to 9 mm. Color red, dark red, or black. Head gently sloping to clypeus, densely deeply punctured, in some specimens a slight impunctate space behind clypeus. Clypeus sparsely hairy, trapezoid, broad in front, one-half of the length of head or longer, punctured as on head, front margin truncate or slightly emarginate and scarcely reflexed between broadly rounded angles; sides straight or with very slight sinuation, not reflexed. Eyes not sunk, small, each eye about one-fifth, usually one-sixth, of the width of head. Labrum as in *parvula*. Mentum with the declivity in anterior third posteriorly margined and pubescent.

Pronotum convex, disc with larger, slightly sparser punctures than those on head, at center an elevated, impunctate, longitudinal space, sides widest behind middle, thence strongly cut back to hind angles, in some specimens a constriction before the angle; in three-quarter view pronotum appearing narrower at base than at apex; base impressed and strongly margined. Elytra as in *parvula*, except that they are scarcely more than twice as long as pronotum, and suture has single row of punctures. Metasternum as in *parvula*. Pygidium with sparse punctures of same large size as those on sides of abdomen.

Front tibiae with third or basal tooth at middle. Middle and hind tarsi with first segment a little longer than second, hind tarsi no longer than hind tibiae. Male genitalia as in figures 130 and 155; basal piece about same length as lobes.

SEXUAL DIMORPHISM: The hind tibial spurs are thicker in the female, but the longest spur is longer than the first hind tarsal segment in both sexes. The pygidium in the male is more transverse and retracted, and the apex of the hind tibiae is less flared outward.

REMARKS: This robust, roundish little species is different in appearance from most other species in the genus except *sparsa* and once recognized is readily identified again. It has a broad clypeus, small eyes, flat labrum, convex pronotum, with strongly angulate sides, short, convex elytra, and the basal tooth of the front tibiae median in position; it is densely and coarsely punctate except on the pygidium which is sparsely punctured, and on the middle of the pronotum which is impunctate. It appears to be wingless (short meta-

sternum, wide scutellum, short and wide elytra, pronotal sides cut back to base), but the humeri and subapical callosities are well marked, and the wings (dissected) are full. The male genitalia are quite unusual in that the apex of each lobe (the lobes come together pincer fashion as in some other species) has a sharp, triangular point that projects upward on the dorsal side (figs. 130, 155). In *ohausi* Moser and *simplex* Blanchard¹ the apices are somewhat similar but do not project upward. Except for the presence of hairs on the clypeus, this species seems to resemble the species of the *simplex* group rather than those of the *trapezifera* group; it differs from the former by lacking depressions or ridges on the head or clypeus, by having stouter hind femora, not so narrow and straight, and by having hairs on the clypeus. (See *sparsa* for comparisons.)

Although the middle tibiae have the usual spinose carinae across the face, the hind tibiae have only a weak suggestion of a carina in some specimens and only an external spine in others. The majority of the specimens, including the type, are piceous or dark red to black in color, but one from Taxco and eight from Cuernavaca are lighter red.

***Diplotaxis marina* Vaurie, new species**

Figures 49, 50, 121

TYPE MATERIAL: Type, male, Santa Maria del Mar, Oaxaca, Mexico, April 7, 1953, R. C. Bechtel and E. I. Schlinger, collectors, and 20 paratopotypes in the University of California at Berkeley; 10 paratopotypes in the American Museum of Natural History.

RANGE: Known only from the type locality in southern Mexico, a village about 25 miles east of Salina Cruz, Oaxaca, on a narrow isthmus on the Gulf of Tehuantepec; 25 other specimens have been examined with the same data as the type.

HABITAT: The type series were collected about 100 feet from the Pacific Ocean in a sandy area, in the early morning, on flowers of what was probably *Mesembryanthemum* (personal communication, Bechtel and Schlinger). *Diplotaxis marina* is one of the few species with small eyes, and it is interesting that it was found, as is true of *aenea*, also a



FIGS. 49-50. *Diplotaxis marina*, type, male. 49. Head and clypeus, tipped slightly backward, showing small eyes. 50. Round pygidium, viewed head-on.

small-eyed species, active in the daytime, not exclusively at night as are most species of the genus.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra multipunctate; pronotum strongly angulate behind middle, front angles right, vaguely impressed, hind angles obtusely rounded; head without frown.

Length, 10 mm. Color black. Head almost perpendicular to clypeus, finely, densely punctured right across the obliterated clypeal suture to the clypeus itself. Clypeus sparsely hairy behind front margin, about one-half of the length of head, punctures scarcely larger than those on head and rather confluent; front margin broadly rounded from side to side except for a slight dip in the middle, no angle present in front of eye (fig. 49), front margin broadly reflexed, sides less reflexed. Eyes not sunk, small, each eye about one-sixth of the width of head. Palpi flattened at base of last segment. Labrum as in *parvula*. Mentum with slight declivity in anterior third posteriorly margined and pubescent.

Pronotum convex, punctures on disc of same size as those on head but somewhat sparser, on sides denser, sides widest behind middle, thence strongly cut back to hind angles. Elytra about three times longer than pronotum, punctures slightly larger, punctures of second interval in two or three rows; costae rather flat, with rather dense punctures; marginal hairs in front longer than scutellum, at middle no longer than one sutural interval is wide; suture with single row of punctures. Metasternum as in *parvula*. Pygidium densely and confluent punctured, scarcely at all transverse (fig. 50).

Front tibiae with third tooth at middle.

¹ These species are discussed in part 1 (Vaurie, 1958).

Middle and hind tarsi and hind femora as in *parvula*. Genitalia as in figure 121 of *angustula* but about one-third longer; basal piece shorter than lobes.

SEXUAL DIMORPHISM: The type (a male) does not show any reliable secondary sexual differences when compared to a dissected female, both sexes having the same width and length of hind tibial spurs (the longest spurs are distinctly longer also than the first tarsal segments), approximately the same shape of pygidium, quite long hairs on the tarsi, and a similar abdomen (not any more concave in the male and the fifth segment short in both sexes). By actual comparison, the hind tarsi are a little shorter in the female, and the spurs are a trifle thicker.

VARIATIONS FROM TYPE: The length varies from 8.5 to 10 mm. Three or four of the specimens are dark red instead of black. The clypeus in some is more sloping than in the type, and in some it is more than one-half of the length of the head (although it is difficult to determine where the clypeus ends). Some specimens have a central impunctate space on the pronotum, others do not; the costae of the elytra are more convex in some, and the punctures of the inner costae may be irregular and out of line; the elytra are sometimes rugose; the marginal hairs are usually longer than the sutural interval is wide.

REMARKS: This species is actually a little out of place in the *trapezifera* group, because the clypeal hairs are not present at the center of the clypeus but are confined to the extreme front edge and in some specimens are scarcely visible (as in *pubipes* Schaeffer¹). The non-angulate clypeus is also not characteristic of the group, although present in the tiny *bifida*, for instance. Other characteristics of *marina* are that the pygidium is almost equal-sided, more round than transverse (fig. 50), the tarsi have quite noticeably long hairs (as in *sparsa*), and the second interval of the elytra is always filled with punctures. The inner costae often have extra punctures so that they do not present a single row as in most species of the group; the femora and metasternal sides in fresh specimens have very long hairs.

This species somewhat resembles *cribriceps* Bates from western Oaxaca and northward, a

species that also is not typical of the group but has more clypeal hairs than *marina*. The two species are alike in the general shape of the pronotum and clypeus, in the median third tooth of the front tibiae, flat labrum, and broad head, but *marina* has fine, not coarse, punctuation on the pronotum, the front margin of the clypeus somewhat more rounded, the eyes even smaller than in *cribriceps* (fig. 49), the marginal hairs of the elytra long, not short, the elytra more elongate, and the male genitalia very different.

The male genitalia are even more elongate than those of *angustula* Moser (fig. 121) and are very similar also to those of *concava* (Guerrero), a species with very large eyes and very long, deeply concave, angulated clypeus. Superficially *marina* is somewhat like *fimbriata* Fall (California and Baja California), but that species has medially cleft claws, longer marginal hairs, deep, coarse punctuation, and the clypeus without hairs.

Two other species in this section occur also in Oaxaca only, but not at sea level; they are *rufipes* and *parvula*, both smaller species than *marina* but with slightly larger eyes, and they differ in the male genitalia as well as in other characters.

***Diplotaxis durango* Vaurie, new species**

Figures 51, 115, 151

TYPE MATERIAL: Type, male, Durango [Durango], Mexico, and one male paratopotype in the Zoologisches Museum, Berlin; another paratopotype, a female, in the American Museum of Natural History; and a male paratype, from Durango, Durango (Wickham), in the British Museum.

RANGE: Known only from the type locality in northwestern Mexico. A fourth specimen from the same place, with the male genitalia exposed but lacking the entire thorax, has been examined.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra unipunctate; pronotum with sides strongly arcuate behind middle, angles obtuse; head with frown.

Length, 5.5 mm. Color tawny. Head descending obliquely to clypeal suture which is obliterated at middle, densely punctured. Clypeus hairy, longer than one-half of the

¹ This species is discussed in part 1 (Vaurie, 1958).

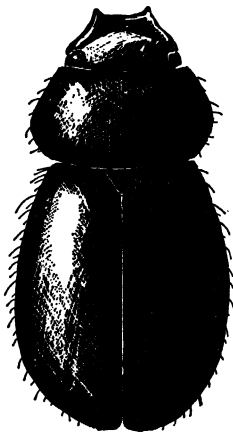


FIG. 51. Type of *Diplotaxis durango*.

length of head, punctures larger, denser; front margin reflexed and scarcely emarginate between rather sharp obtuse angles, sides converging obliquely to front, not sinuate. Palpi with last segment flattened basally. Eyes, labrum, and mentum as in *parvula* but labrum wider.

Pronotum as in *parvula* except that punctures of disc are sparser than those on head (separated by at least twice their diameter). Elytra two and one-half times longer than pronotum, punctures twice as large as those on pronotum, and dense, some punctures of second interval as large as those of striae; costae convex; marginal hairs as long as scutellum, suture with single row of punctures. Metasternum slightly depressed, one and one-quarter times as long as width of hind femora. Pygidium with punctures sparser than those on pronotal disc.

Front tibiae as in *parvula*. Middle tarsi with first two segments about equal in length, hind tarsi with first segment slightly shorter than second. Hind femora not bulbous but wider than in *parvula*. Hind tarsi longer than hind tibiae. Genitalia as in figures 115 and 151 of *trapezifera*, except that they are less thick at base and are shorter; basal piece shorter than lobes.

SEXUAL DIMORPHISM: It was necessary for me to dissect the only female available to ascertain the sex; therefore the secondary sexual characters are not reliable. The hind femora appear wider in the female.

VARIATIONS FROM TYPE: The specimens range in length from 5.5 to 6 mm. In one of

the paratypes the clypeal suture is bent back sinuately at the middle; in another there is a slight convexity behind the clypeus; in one the pronotal punctures are separated by only their own width; in two of the paratypes the elytra are only twice longer than the pronotum. The third tooth on the front tibiae may be nearer the middle, and the first segment of the middle tarsi may be shorter than the second, as on the hind tarsi.

REMARKS: The sparse punctuation of the pronotum and pygidium and the tiny size (6 mm. or less) and small eyes are as in *parvula* Burmeister (Oaxaca), but the elytra have long, not short, marginal hairs in *durango* and are sparsely, shallowly punctured, not coarsely and deeply, the clypeus is much longer and lacks tumidity, and the male genitalia are very different. The species is like *roberti*, new species (Guerrero), in respect to the clypeus, but the eyes are smaller in *durango*, the pronotum is larger, more sparsely punctured, the sides are more arcuate, the marginal hairs are long, and the genitalia are different. It is the same size and proportions as *rufipes* Moser (Oaxaca), but is not densely punctate as is *rufipes*, nor are the eyes sunk below the level of the head; the male genitalia are entirely different. The male genitalia of *durango* are exactly like those of some specimens of *trapezifera* Bates from Nombre de Dios, Durango, but the elytra are very short in *durango* (fig. 51), whereas they are three times longer than the pronotum in *trapezifera*. The proportions of *durango* are more like those of *denigrata* Bates (Veracruz, Yucatan), and the genitalia are not very different, but that species is larger and dark, not tawny, is more densely, coarsely punctured, and has larger eyes and narrower labrum.

The short metasternum and short elytra might lead one to think the wings were shortened, but a wing of the type was dissected and it appears to be of normal length, i.e., as long as the length of the beetle.

***Diplotaxis bifida* Vaurie, new species**

Figures 33, 34, 139–141

TYPE MATERIAL: Type, male, Acatlan, Puebla, July 4, 1959, P. and C. Vaurie, collectors, and 10 paratopotypes (two males, eight females), and one female paratype from same locality but collected June 17, 1955, by R. B.

and J. M. Selander, in the collection of the American Museum of Natural History; one male paratype from Mexcala, Guerrero, Mexico, July 9, 1955, R. B. and J. M. Selander, collectors, in the collection of R. B. Selander, and two female paratypes from 15 miles south of Mexicala [= Mexcala], Guerrero, August 26, 1958, H. F. Howden, collector, in the Canadian National Collection, Ottawa.

RANGE: Southern Mexico in the southern part of the state of Puebla and the adjacent north central part of Guerrero. Twenty-seven additional specimens not included in the paratypes were collected by P. and C. Vaurie at the type locality.

HABITAT: All specimens were collected at night; the two paratypes from Mexcala collected by H. Howden were taken by beating a species of *Acacia*, and the type, paratypes, and other specimens from Acatlan were also taken on *Acacia* or *Acacia*-like trees.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Marginal hairs of elytra long; second interval of elytra irregularly unipunctate; sides of pronotum strongly arcuate behind middle, front angles small and acute, hind angles ill defined, rounded off; head without frown.

Length, 6 mm. Color dark red. Head rounded to clypeal suture which is obliterated at middle; densely punctured, sides elevated over eyes. Clypeus with a few hairs, punctured exactly as on head, the punctures continuous across the clypeal suture; about one-half of the length of head, front margin slightly reflexed, not angulate, but forming a semicircle from side to side, with a very slight emargination at middle; canthi very large. Eyes sunk, small, each eye about one-fifth of the width of head. Palpi with last segment not impressed basally. Labrum bilobed, its center third broadly cleft to the level of the reflexed under side of the clypeus, and same length as the under side, the sides bulbous (fig. 34); densely punctured. Mentum rather flat, but with declivity indicated in apical third by pubescent ridge.

Pronotum large, punctures of same size as those on head but sparse, not touching, especially on disc; sides widest behind middle. Elytra nearly two and one-half times longer than pronotum, punctures slightly larger, not dense; punctures of second interval of same

size as those on striae; costae flat, with only four or five punctures of smaller size; marginal hairs longer than scutellum. Metasternum one and one-half times longer than width of hind femora. Hind coxal plate laterally angulate in front. Pygidium with large, rugose, irregular, sparse punctures.

Front tibiae with third tooth in front of middle. Hind femora twice wider at middle than hind tibiae. Middle and hind tarsi with first two segments about equal in length, hind tarsi no longer than hind tibiae. Genitalia as in figures 139 to 141; basal piece one and one-half times longer than lateral lobes.

SEXUAL DIMORPHISM: No significant external differences are visible between the sexes, and dissection is usually necessary for the sex to be determined. However, the hind femora and hind tibial spurs of females are slightly wider than those of males (the longer of these spurs is longer than the first segment of the hind tarsi in both sexes), and the center of the abdomen in males is somewhat concave, not convex as in females.

VARIATIONS FROM TYPE: The paratypes and other specimens range in length from 5.5 to 6.5 mm. Some have the elytra slightly shorter than the type, the second interval more regularly unipunctate, and the punctures of the pygidium not rugose. The clypeus does not necessarily show any emargination in front (fig. 33).

REMARKS: The combination of bifid labrum with small, deep-set eyes, hairy clypeus with rounded front margin, glabrous elytra with virtually impunctate costae, and sinuate lobes of the male genitalia sufficiently distinguish this species from other species of the genus. It does not seem very characteristic of the *trapezifera* group because of its labrum and rounded clypeus, but it is placed here because of the presence of hairs on the clypeus and the great similarity of the male genitalia to those of *rufipes* and *incisa* of this group. It is most similar to *rufipes* (which follows), the male genitalia being almost the same in the two species except for the longer basal piece of *bifida*. (See *rufipes* for further comparisons.) A species rather different in appearance, with the same general type of genitalia, is *incisa* which, curiously enough, is known from the same two localities as *bifida*. The labrum of *bifida* (fig. 34) is not so abruptly or deeply di-

vided as it is in *knausii*, *fissilabris*, and the species of the *cribulosa* group¹; rather it is similar to the labrum of *rudis* and *rex*,¹ two dorsally hairy species from the United States.

***Diplotaxis rufipes* Moser**

Figures 139–141

Diplotaxis rufipes MOSER, 1921, p. 180 ("Mexico (Sierra Mixteca)" [Oaxaca]; type, male, in the Zoologisches Museum, Berlin).

RANGE: Known only from the northwestern part of the state of Oaxaca, southern Mexico. Seven specimens have been examined as follows: the type, a male, and five other specimens from the Sierra de las Mixtecas, which is northwest of the city of Oaxaca; and one male from Valerio Trujano, Oaxaca, 4500 feet, in the district of Cuicatlan to the east of the Sierra.

DIAGNOSIS AND DESCRIPTION: (See also characters of group). Marginal hairs of elytra long; second interval of elytra irregularly unpunctate (more or less double at rear in some specimens); sides of pronotum strongly arcuate behind middle, front angles rather acute, hind angles rounded off; head with frown in front.

Length, 5.5 to 7 mm. Color dark red, the head infusate. Head convex, either with frown or with transverse impunctate space behind clypeus, ridge present over eyes; densely punctured. Clypeus hairy, longer than one-half of the length of head, punctures larger than those on head, front margin strongly reflexed (in some specimens reflexed part equals one-half of the length of clypeus), and slightly emarginate between blunt obtuse angles, sides strongly reflexed; canthi prominent as in *bifida*. Eyes and palpi as in *bifida*. Labrum concave but not bilobed. Mentum as in *bifida*.

Pronotum and elytra as in *bifida*, except that costae of elytra have even fewer than four punctures, some specimens having no punctures. Metasternum as in *bifida*. Hind coxal plate with very slight angulation at sides. Pygidium punctured sparsely or densely.

Legs as in *bifida*, except for rather wider hind femora and longer hind tibiae. Male genitalia as in figures 139 to 141 of *bifida*, but

basal piece only slightly longer than lobes.

SEXUAL DIMORPHISM: I find no reliable way to distinguish the sexes without dissection.

REMARKS: This tiny species agrees in many characters with the equally tiny *bifida*, even in the rather unusual sinuate lobes of the male genitalia with their sharply turned-down, elongate, angular apices (figs. 139–141). The clypeus has the sides in front angulate, however, not rounded as in *bifida*, the labrum is concave but not bilobed as in *bifida*, and the hind tarsi, at least in males, are longer than the hind tibiae. In addition, the eighth sternite differs in shape in the two species, being narrow apically in *rufipes* and exceedingly broad in *bifida* (as broad at apex as at base).

Both *rufipes* and *bifida* are rather similar to *pumila* Fall (*truncatula* group), which agrees with them by having hairs on the clypeus and the elytral costae virtually impunctate, but which differs by having the sides of the abdomen strongly ridged, the marginal hairs of the elytra very short, the male genitalia different in shape, and the habitat in Arizona.

On the type specimen of *rufipes* the marginal hairs of the elytra are worn short; they are short also on a dissected male from Valerio Trujano which is lighter in color than other specimens.

***Diplotaxis iguala* Vaurie, new species**

Figures 35, 120

TYPE MATERIAL: Type, male, Guerrero, Mexico, August 8, 1902 (W. L. Tower collection), and nine paratopotypes in the American Museum of Natural History; also eight paratypes from Iguala, Guerrero, June 20, 1943 (Jenkins), in the United States National Museum; two paratypes from Iguala, July 8, 1957, R. B. and J. M. Selander, collectors, in the collection of R. B. Selander.

RANGE: Morelos, Guerrero, and western Oaxaca in southern Mexico. In addition to the paratypes, 31 other specimens have been examined. (See Appendix.)

HABITAT: Eight of the paratypes from Iguala were collected on *Luffa* (genus of Cucurbitaceae) and sesame (*Sesamum*). Three specimens from Cocula, Guerrero, were taken on *ajonjoli*, which also is sesame.

DIAGNOSIS AND DESCRIPTION OF TYPE, MALE: (See also characters of group). Margi-

¹ These species are discussed in part 1 (Vaurie, 1958).

nal hairs of elytra short, sparse (worn); second interval of elytra unipunctate; pronotum with sides gently arcuate, front and hind angles obtuse; head with slight frown.

Length, 5 mm. Color dark red, abdomen blackish. Head slightly convex, with fine, dense, somewhat confluent punctures. Clypeal suture obliterated at middle. Clypeus hairy, more than one-half as long as head, front margin emarginate and strongly reflexed between acute dentiform angles, sides slightly sinuate and converging narrowly to front, punctured as on head; canthi not angulate. Eyes small, not sunk, each eye about one-sixth of the width of head, and nearly flat, not bulbous on the sides. Labrum slightly concave, shorter than reflexed under side of clypeus, densely, strongly punctured. Palpi and mentum as in *bifida*.

Pronotum transverse, only slightly longer than head and clypeus combined, punctures of same size as those on head but sparser (separated by about their own diameter), sides widest behind middle, base somewhat depressed transversely. Elytra about two and one-half times longer than pronotum, punctures larger than those on pronotum, punctures of second interval as large as those on striae; costae flat, punctate, very narrow; marginal hairs about as long as one sutural interval is wide. Metasternum as in *bifida*. Pygidium not large, punctures sparse.

Front tibiae as in *bifida*. Hind femora twice as wide as hind tibiae, but not bulbous. Middle tarsi with first two segments about equal in length, hind tarsi with first segment about one-half of the length of second, hind tarsi slightly longer than hind tibiae. Genitalia as in figure 120 of *angularis*, except that lobes are joined nearer the middle and the apices are not turned downward; basal piece only one-half of the length of lobes.

SEXUAL DIMORPHISM: The type (male) and other males have the clypeus relatively narrower in front than do females, usually with sharper angles, the pygidium more transverse, the hind tibial spurs and hind femora narrower, the apex of the hind tibiae less flared outward apically. The front claws of the male are less angularly bent and have the unguis much shorter than the claw.

VARIATIONS FROM TYPE: The paratypes and other specimens may be as long as 8 mm.;

some are entirely black, some partly black, some reddish and black. In some individuals the clypeal suture is distinct at the middle where it bends slightly backward, and the clypeus is as long as the head. The declivity of the mentum may be shorter than in the type and more marked. Some individuals have the elytra only twice as long as the pronotum; some have the marginal hairs of the elytra almost as long as the scutellum; and some have the punctures of the pygidium rugose. The metasternum in some specimens seems shorter than in the type, and it seems shorter in females.

REMARKS: In collections this small species has often been confused with *aenea* and *corrosa*,¹ from both of which it differs by having the pronotum short and transverse, not long, with its front angles not acute, but forming right angles, the marginal hairs of the elytra much shorter, the hairs of the venter less abundant, no visible hairs on the elytra, the color without greenish sheen, and the antennal club usually pale, not black. (See discussion below.) The advanced clypeus (fig. 35), very small, flattish eyes, and long antennal club, however, are the same as in the *aenea* group. In general appearance, *iguala* is more like *corrosa* (San Luis Potosi, Hidalgo, Guanajuato, and state of Mexico), both species having rather large, coarse punctures on the dorsum. The male genitalia (fig. 120) have very elongate lobes in both; the lobes are joined near the middle in *iguala* but near the base in *corrosa*, and the apices are widened in *corrosa*; the basal piece is short in *corrosa*, but not so short as in *iguala*. These two species have not been collected from the same locality, but *aenea* occurs with *iguala* in Chilpancingo, Guerrero, and in Cuernavaca, Morelos. All three species have the metasternum quite short, which often denotes a wingless condition, but in these species the wings are normal and long.

In many species of the genus the eyes seem small only because the head is broader than usual across the front, but in *iguala* and the *aenea* group the eyes are not only small but

¹ These two species of the *aenea* group are discussed in part 1 (Vaurie, 1958), but this group should, I now believe, be placed here within the *trapezifera* group, even though the third species of the group (*clypeata*) is entirely hairy-scaly above.

are also somewhat flattened, so that they do not bulge outward when seen from above. When the head is exerted so that the eyes are pulled out from the thorax, it can be seen that they are kidney shaped (fig. 8). The lower edge of the eye is slightly sinuate in other species also, but not so markedly as in these species. The antennal club is as long as the diameter of the eye, measured across the longest part of the eye.

Two of the principal distinguishing characteristics of the *aenea* group (as given in part 1, Vaurie, 1958) were the black or at least dark antennal club, and the small eyes. Both these characters are found in some specimens of the present species, and it seems therefore best to include the *aenea* group here with the other small-eyed species instead of transferring *iguala* to the *aenea* group. Of the 51 specimens examined of *iguala*, only four have the antennal club darkened (two females from Cocula and Amula, and two dissected males, one from Amula and one from Chilpancingo, all localities in Guerrero).

Diplotaxis corrosa Bates

This species is discussed in part 1 (Vaurie, 1958) under the *aenea* group.

Diplotaxis aenea Blanchard

This species is discussed in part 1 (Vaurie, 1958) under the *aenea* group.

Diplotaxis clypeata Bates

This species is discussed in part 1 (Vaurie, 1958) under the *aenea* group.

SPECIES GROUP *MISELLA*

The following species are included in this group: *Diplotaxis misella* Fall; *brevicornis* Cazier; *deserta* Fall; *incuria* Fall; *brachyptera*, new species; and *pinalica* Fall.

The species of this group, all of which occur north of southern Chihuahua, resemble in general appearance the species of the *trapezifera* group, but, with the exception of *misella*, they have no hairs visible on the clypeus. They are small, elongate species (5.5 to 7 mm.), although some individuals of *pinalica* reach 9 mm., of tawny color (*incuria* is dark red), with trapezoid clypeus as in the *trapezifera* group, with the front angles often sharper and less rounded in the males than in

the females. All the species have the eyes rather sunk into the head (i.e., sides of head elevated over eyes) and the head usually pulled back into the prothorax so that only the front angle of the eye is visible; *misella* has larger eyes, but the other species have small eyes. Although the eyes are not prominent, the ocular canthi are usually both prominent and quite strongly angulate, and the clypeal suture on the sides is strongly marked across the canthi (fig. 37).

The character that seems most significant in the grouping together of these particular species is the genitalia of the male which have the basal piece much longer than the lateral lobes, in some individuals twice as long (fig. 162). Some species of the *trapezifera* group have the lobes shorter than the basal piece but not to such a degree as here, and these other species do not occur in the United States.

The only ecological notes available are for *pinalica*.

Three of the species of this group have not been taken from south of the border of the United States (*deserta*, *incuria*, and *pinalica*); two (*brachyptera*, *brevicornis*) have been taken sparingly not very far south of the border in northern Chihuahua; only *misella* proves more abundant in Chihuahua than in the United States. None of the species ranges south of Chihuahua.

About 275 specimens and the types of all the forms except *brevicornis* Cazier have been examined.

CHARACTERS OF THE *misella* GROUP

The following characters are common to all the species of the group and are not necessarily repeated under each description:

Mandibles small. Antennae 10-segmented. Clypeal suture obliterated at middle. Maxillary palpi with last segment impressed or at least flattened basally (often difficult to see because of high gloss). Pronotum with slight depression or impression behind front margin laterally. Elytra with marginal hairs as long, or nearly as long, as scutellum, and with costae (except for most specimens of *pinalica*) having a single row of punctures that are smaller and sparser than those of the broad intervals. Abdomen not ridged laterally; generally sparsely punctured; fifth segment (pro-

pygidium) not grooved or ridged above pygidium. Hind coxae and hind coxal plate usually impunctate and shining (except in *pinalica*). Claws bent angularly or abruptly, cleft subapically, tooth shorter than claw.

KEY TO THE SPECIES OF THE *misella* GROUP

1. Front tibiae distinctly bidentate as in figure 38; wings abbreviated; head sparsely, shallowly punctured, almost smooth; elytra with tiny hairs readily visible on outer rows; New Mexico, northern Chihuahua . . . *brachyptera*
Front tibiae with third tooth present but it may be nearly obsolete; wings normal; head densely, distinctly punctured; elytra glabrous 2
2. Elytra with second interval multipunctate; pronotum with median smooth space; hind coxal plate densely punctured; Arizona and New Mexico *pinalica*
Elytra with second interval unipunctate (perhaps irregularly so); pronotum seldom with median smooth space; hind coxal plate virtually impunctate; Arizona, New Mexico, and elsewhere 3
3. Eyes very small, each at least one-sixth of width of head; color usually dark, appearing black; Nevada only *incuria*
Eyes each from one-fifth to one-fourth of width of head; color reddish or tawny; elsewhere than in Nevada 4
4. Clypeus sparsely hairy; each eye usually but one-quarter of width of head; hind coxal plate rarely margined at sides . . . *misella*
Clypeus without hairs; each eye usually less than one-quarter of width of head; hind coxal plate distinctly ridged at sides . . . 5
5. Pronotum convex, shorter than in *deserta*; male genitalia as in figure 168; New Mexico, Arizona, Texas, Chihuahua . . . *brevicornis*
Pronotum flat, longer than in *brevicornis*; male genitalia as in figure 166; California, Arizona, Utah *deserta*

Diplotaxis misella Fall

Figures 30, 162, 163

Diplotaxis misella FALL, 1909, p. 91, pl. 1, fig. 54 (Cochise County, Arizona; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Very similar to the other species of the group but differing from them by having hairs visible on the front of the clypeus, and in the male genitalia. The eyes are larger than those of *incuria* or those of *brevi-*

cornis, more like those of *deserta*, but the pronotum and elytra are shorter and stouter than those of *deserta* and are more like those of *brevicornis* and *incuria*.

RANGE: Chihuahua and extreme northern Sonora, Mexico, northward in Arizona to Wickenburg. More than 200 specimens have been examined. (See Appendix for further data.)

DESCRIPTION: (See also characters of the group). Length, 5.5 to 7 mm. Color tawny. Head usually with frown over clypeus and convex to the clypeal suture; densely, confluent punctured. Clypeus sparsely hairy, concave, longer than one-half of the length of head, in some specimens as long as head, punctures slightly larger and sparser than those on head, front margin slightly emarginate and strongly, broadly reflexed between sharp or blunt obtuse angles, sides bent inward in front of eye and narrowing obliquely to front. Eyes rather sunken, large, each eye one-quarter or one-fifth of the width of head. Labrum slightly or strongly concave, same length as, or longer than, reflexed under side of clypeus, densely punctured. Mentum flat, apical declivity indicated only by row of hairs and a slight ridge.

Pronotum punctured sparsely or densely with punctures of same size as those on head, sides strongly subangulate at about middle, thence narrowed to obtuse front angles and to rounded-off, ill-defined, hind angles; base more or less impunctate and shining. Scutellum usually impunctate. Elytra two and one-half times longer than pronotum, punctures of same size, but more sparsely placed; second interval unipunctate, the punctures rather irregularly placed and not filling the interval; costae convex, often nearly as wide as second interval. Metasternum one and one-quarter times longer than width of hind femora. Hind coxal plate with sides truncate, usually not margined, at least not carinate. Pygidium irregularly, sparsely, shallowly punctured.

Front tibiae appearing bidentate because third or basal tooth is very small or nearly obsolete; tooth is placed slightly in front of middle. Middle tarsi with first two segments equal in length, hind tarsi with first segment at least one-third shorter than second. Hind

femora somewhat inflated at middle (fig. 30) and sinuate to apex. Male genitalia as in figures 162 and 163; basal piece one and one-half times longer than lobes.

SEXUAL DIMORPHISM: If one has specimens of only one sex, it is difficult to determine which sex it is, although the female has the antennal club usually shorter and stouter than the male. The spurs of the hind tibiae, the pygidium, and the fifth abdominal segment seem to show no sexual differences.

REMARKS: The larger eyes of this species seem nearly as small as those of *brevicornis* in those specimens that have the head drawn far back under the front of the pronotum. Likewise, the small eyes of *brevicornis* (New Mexico, Arizona, Texas, and Chihuahua) appear somewhat larger if the head is extruded. Aside from the hairy clypeus, the eyes, and the genitalia of the male, *misella* agrees in nearly every character with *brevicornis*, which, however, is generally of smaller size, generally has the pronotum more sparsely and shallowly punctured, and generally has the labrum more deeply concave. In Arizona (where *brevicornis* is scarce), individuals of *misella* are more densely and coarsely punctured on the pronotum, but from the three localities in Chihuahua, Mexico, where a large series of 165 specimens was collected by the David Rockefeller expedition of the American Museum of Natural History in 1947, the populations of *misella* have the pronotal punctures sparser and shallower, as in most individuals of *brevicornis*. The Mexican specimens of *misella* often have a longitudinal impunctate space on the top of the head not found in *brevicornis*. The lobes of the male genitalia (figs. 162, 163) are much stouter than in the other species of the group.

The hairy clypeus of *misella* caused me at first to include it as one of the species of the *trapezifera* group, but it seems more similar to the small species grouped here; also the male genitalia of this group differ from those of the rest of the genus by having the basal piece much longer than the lateral lobes, not the same length or but slightly longer or shorter. Another species with genitalia almost identical to those of *misella* is *guatemalica* Moser, a sparsely hairy species already treated in part 1 of the revision (Vaurie, 1958).

Diplotaxis brevicornis Cazier

Figure 168

Diplotaxis brevicornis CAZIER, 1940c, p. 136 (Pyramid Peak, Dona Ana County, New Mexico; type in the Southern California Academy of Science, Los Angeles).

DIAGNOSIS: Very similar to *misella*, but lacking the clypeal hairs; with somewhat smaller eyes, and more sparsely and shallowly punctured pronotum than *misella*; also with the hind coxal plate distinctly margined, which is rarely true of *misella*. Differs from *deserta* also in pronotal punctures and in the more rounded, less acute angles of the clypeus, and from both species in the shape of the lobes of the male genitalia.

RANGE: Chihuahua, Mexico, north in the United States to southeastern Arizona, New Mexico, and Texas. Fifteen specimens have been examined. (See Appendix for further data.)

DESCRIPTION: (See also characters of group). Length, 5.5 to 6.5 mm. Color tawny. Head and clypeus as in *misella* but clypeus not hairy and clypeal angles more rounded. Eyes rather sunk, small, each eye one-fifth or one-sixth of the width of head. Labrum, mentum as in *misella*, but labrum even more deeply concave, nearly bilobed.

Pronotum on disc punctured more sparsely than head with punctures of same size, sides strongly arcuate at middle; angles and base as in *misella*. Scutellum and elytra as in *misella*, but punctures usually larger than those on pronotum and costae not so wide as in *misella*. Metasternum and pygidium as in *misella*. Hind coxal plate with sides truncate, margined, margin not carinate.

Front tibiae with third tooth small, inconspicuous, situated slightly in front of middle. Middle and hind tarsi and hind femora as in *misella*. Male genitalia as in figure 168; basal piece about one and one-quarter times longer than lobes.

SEXUAL DIMORPHISM: About as in *misella*.

REMARKS: Single specimens of this species may be difficult to distinguish from *misella*, if the hairs of the clypeus are worn off or not visible, but a dissected male can be separated at once from a male of *misella* or from any other species of the group or the genus. The

inner margins of the lateral lobes in four males of *brevicornis* are strongly emarginate before the apex, forming a triangular hole when the lobes are partly closed (fig. 168); when closed farther, the lobes overlap.

Although in the United States *misella* and *brevicornis* are allopatric, the former being found only in Arizona and the latter to the east in New Mexico and Texas (and one specimen in eastern Arizona), both species occur in Chihuahua where *brevicornis* occurs within the range of *misella* at Delicias. The latter species is everywhere more abundant.

***Diplotaxis deserta* Fall**

Figures 30, 166, 167

Diplotaxis deserta FALL, 1932, p. 196 (Palm Springs, California; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Differs from the preceding species (*brevicornis* and *misella*) by having both the pronotum and elytra proportionately longer and narrower, the elytra more parallel, not widened behind. Differs from *incuria* also by having the pronotum less transverse and the eyes larger. Differs from all three species in characters of the male genitalia.

RANGE: Southern California, adjacent northwestern Arizona, and southwestern Utah. Thirteen specimens have been examined as follows: the type, a male, from Palm Springs, Riverside County, California, and six others, taken in April, May, June; one specimen from the Mohave Desert; one male from Kingman, Arizona, in May; one male, two females, from St. George, Utah; one, Provo, Utah.

DESCRIPTION: (See also characters of group). Length 6.5 (Fall gives 5.5) to 7 mm. Color tawny. Head, clypeus, labrum, and mentum as in *misella*, except that the head does not usually have a frown over the clypeus (two specimens have a slight ridge), and the clypeus is not hairy. Eyes in some specimens as in *misella*, in others smaller.

Pronotum with punctures of disc larger and sparser than those on head, sides and angles and base as in *misella*. Scutellum impunctate or with a few punctures on borders. Elytra three times longer than pronotum, punctures of same size as, or slightly larger than, those on pronotum; costae and punctures

of second interval as in *misella*. Metasternum twice longer than width of hind femora; sides of hind coxal plate truncate and margined, margin not carinate. Pygidium as in *misella*, in some specimens so sparse as to have only 12 punctures.

Front tibiae with third tooth about at middle. Middle and hind tarsi and hind femora as in *misella*. Male genitalia as in figures 166 and 167; basal piece twice as long as lateral lobes.

SEXUAL DIMORPHISM: As given for *misella*.

REMARKS: The male genitalia of this species are about the same as those of *pinalica* Fall from Arizona, a slightly larger species that has the front angles of the pronotum more acute than obtuse, and the second interval of the elytra multipunctate, not unipunctate as in *deserta*. The hind coxal plate in *deserta* is virtually impunctate (the greatest number of punctures are seven in one specimen), but in *pinalica* it is densely punctured.

Before dissecting the male in a series of three specimens marked "St. George, Utah," I had placed them with *brevicornis* because of their pronotum which appeared short as in that species and because of their smaller eyes. The male, however, is definitely not that species, but *deserta*, and I have tentatively placed the females also with *deserta*. The females resemble most specimens of *deserta* by having the front of the head slightly concave without any frown.

***Diplotaxis incuria* Fall**

Figures 30, 164, 165

Diplotaxis incuria FALL, 1932, p. 196 (Esmeralda County, Nevada; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Darker than the other species of the group, and differing from the three preceding species in the smaller eyes which, from above, are just barely visible on the sides of the head, in the wider labrum, and in the more abruptly cut-back and more angulate sides of the pronotum. The pronotum is short and very transverse as in *misella* and *brevicornis*, not long as in *deserta* and *pinalica*.

RANGE: Known only from Nevada, from which state I have examined 16 specimens as follows: the type and five other specimens from Esmeralda County, and 10 specimens

from 3 to 6 miles east of Sodaville, Mineral County, all taken in June.

DESCRIPTION: (See also characters of group). Length, 6 to 6.5 mm. Color, head usually black, the rest of dorsum dark red, appearing black to the naked eye. Head descending abruptly to clypeus, convex behind clypeus but not distinctly ridged, densely punctured. Clypeus as in *misella* but not hairy, the sides usually bent inward in front of eye. Eyes sunk, each eye one-sixth or one-seventh of the width of head. Labrum concave, very broad, same length as reflexed under side of clypeus, faintly punctured. Mentum rather flat, but ridge of apical declivity well marked and pubescent.

Pronotum with punctures on disc sparser than those on head but of same size, sides strongly subangulate behind middle, thence narrowed to obtuse but somewhat drawn-forward front angles, and constricted and slightly sinuate to ill-defined, rounded-off hind angles; base as in *misella*. Scutellum with shallow, rugose punctures. Elytra three times longer than pronotum, punctures of same size, somewhat more sparsely placed; second interval unipunctate, punctures often irregularly spaced but never filling the interval; costae flat or slightly convex. Metasternum about twice as long as hind femora are wide. Hind coxal plate with sides truncate and margined, not carinate. Pygidium rather sparsely, often rugosely, punctured.

Front tibiae with third tooth small, placed about at middle. Middle and hind tarsi as in *misella*, but the first segments appear narrower basally and more bulbous apically. Hind femora as in *misella*; claws appear more elongate, less angularly bent, than in group. Male genitalia as in figures 164 and 165; basal piece one and one-half times longer than lateral lobes.

SEXUAL DIMORPHISM: The female has the hind femora wider and the fifth abdominal segment a little longer than does the male, but dissection is the only way to be sure of the sex.

REMARKS: In addition to the characters given in the diagnosis, this species differs from the others in the group in the shape of the lobes of the male genitalia (figs. 164, 165). The lobes are stouter than they are in *pinallia*, a larger species.

***Diplotaxis brachyptera* Vaurie, new species**

Figures 38, 166

TYPE MATERIAL: Type, male, Samalayuca, Chihuahua, Mexico, June 24, 1947, David Rockefeller expedition, C. Michener, collector, in the American Museum of Natural History. One male and one female paratype from Socorro County, New Mexico, April 24, 1944, B. Rotger, collector, in his collection.

DIAGNOSIS: This smooth, shallowly punctured species has three characters not present in the other species of the group: the elytra have hairs emerging, the front tibiae are unmistakably bidentate (fig. 38), and the elytra are rounded off, without subapical callosities, because the wings are abbreviated. In addition, the eyes are as small as in *incuria*, and the punctures on the head are so fine and shallow that the head appears virtually impunctate. The first tarsal segment on the middle legs is longer than the second.

RANGE: Southern New Mexico and northern Chihuahua.

DESCRIPTION OF TYPE, MALE: (See also characters of group). Length, 6.5 mm. Color tawny. Head sparsely, shallowly punctured, convex to clypeal suture. Clypeus one-half of the length of head, punctures same as on head, front margin shallowly emarginate and reflexed between sharp acute angles, sides not indented or sinuate. Eyes small, scarcely sunk, each eye about one-sixth of the width of head. Labrum very wide, flat in front where level with, also longer than, reflexed under side of clypeus, somewhat concave behind. Mentum with apical declivity marked by ridge and pubescence.

Pronotum transverse, punctures on disc of same size and density as those on head, but laterally punctures denser; sides and base as in *misella*, except that hind angles are obtuse and well defined. Scutellum impunctate. Elytra nearly three times longer than pronotum, dorsal hairs scarcely visible but present in all punctures (see variations below), punctures larger and sparser than those on head; second interval unipunctate, punctures not filling interval; costae flat, with tiny, sparse punctures; marginal hairs worn (long in other specimens). Metasternum scarcely longer than hind femora are wide. Hind coxal plate margined laterally, truncate, the margin

rather carinate. Pygidium sparsely punctured, surface rugose.

Front tibiae bidentate without trace of third tooth, apical projection very long. Middle tarsi with first segment longer than second, hind tarsi with first two segments about equal in length. Hind femora not inflated. Hind tibiae scarcely carinate on outer edge. Claws as in group but longer and thinner. Genitalia as in *deserta* (fig. 166); basal piece one and one-half times longer than lobes.

SEXUAL DIMORPHISM: The size of the eyes, the shape of the pygidium, the width of the hind femora, and the tibial spurs seem to be the same in both sexes. The hind tarsi appear longer in the male.

VARIATIONS FROM TYPE: The paratypes are a little longer (7 and 7.5 mm.) than the type and are more reddish, not so tawny. The front angles of the clypeus are not so sharp even in the male paratype. The dorsal elytral hairs are more evident in the paratypes, especially on the outer rows of punctures; the marginal hairs of the elytra are as long as the scutellum; the scutellum has faint apical punctures.

REMARKS: Elsewhere in the genus (*fimbriata*, *muricata*, *obscura*) short- and long-winged individuals are present in the same species, which may prove to be true here also when more material is available. The wings of *brachyptera* are not folded; they are a little shorter than the elytra and terminate just beyond the pterostigma or costal cell, where they are irregularly rounded off. One wing was dissected from the type; the outline of the other wing can be seen through the semitransparent elytron. These short wings were called to my attention by Dr. Mont A. Cazier, who recognized the Samalayuca specimen as probably new when sorting the populations of *brevicornis* and *misella* from Mexico. Subsequently, in material lent by the Reverend Bernard Rotger, of Pagosa Springs, Colorado, I found two other specimens already marked as "n. sp."

Although this species differs in a number of ways from the others of the group (see diagnosis), it has the same kind of male genitalia with a very long basal piece. In fact, the lateral lobes are the same as are shown for *deserta* (fig. 166), but proportionately larger than those of *deserta*. The eighth sternite is

abruptly narrowed and acuminate, as are that of *incuria* and that of *pinalica*.

The tips of all the tibial spurs are yellow and translucent in contrast to the dark-colored basal part. The bidentate front tibiae are similar to those of *languida* LeConte from the southeastern United States, a quite different species. Another short-winged species that also has hairs on the elytra (on the pronotum as well) is *brevisetosa* Linell from Texas, but this species has, among other differences, a much rounder, not elongate, general shape, and different head and clypeus (short clypeus with rounded front margin).

Diplotaxis pinalica Fall

Figures 37, 166

Diplotaxis pinalica FALL, 1932, p. 196 (Pinal Mountains, Arizona; type, male, in the Museum of Comparative Zoölogy).

Diplotaxis microps CAZIER, 1940c, p. 134 (Cochise Stronghold, Cochise County, Arizona; type, female, in the American Museum of Natural History). New synonymy.

Diplotaxis recticanthus CAZIER, 1940c, p. 135 (White Mountains, Arizona; type, male, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: This species differs from the others of the group by having the second interval of the elytra not unipunctate, but furnished with two or three irregular rows of punctures, by having the base of the elytra laterally very densely and confluent punctured, the hind coxal plate well punctured, not impunctate, and by having a marked smooth median space on the pronotum. It is generally a larger and stouter species than those that precede.

RANGE: Arizona and western New Mexico. A total of 25 specimens has been examined (see Appendix).

HABITAT: A label signed by H. F. Tate on one of the specimens from Cochise Stronghold, Arizona, says that these beetles hide in the soil near the trunks of peach and other deciduous fruit trees in the daytime and come out at night to feed on the young growth; a specimen from Molina Basin, Arizona, taken by G. M. Bradt is labeled as having been taken "on bear grass"; a male from Yavapai County, Arizona, was taken by L. K. Gloyd

at light. In New Mexico three specimens were taken "feeding on *Quercus undulata*" in June, 1960, between 9 and 10 P.M., in Gila National Forest, Grant County, by C. Clayton Hoff.

DESCRIPTION: (See also characters of group). Length, 7 to 9 mm. Color red-brown. Head convex or flat in front, without frown, densely punctured; clypeal suture visible at middle in one specimen of six examined. Clypeus concave, longer than one-half of length of head, punctures usually of same size and density and continuous across the suture (punctures slightly larger than those on head in one of six specimens), margins as in *misella*. Eyes sunk, small, each eye about one-fifth or one-sixth of the width of head. Labrum and mentum as in *misella*, but labrum more strongly concave.

Pronotum with sides strongly arcuate behind middle, thence narrowing obliquely to obtuse, but rather drawn-forward front angles, and to obtuse or rounded-off hind angles, pronotum behind front angles rather impressed in some specimens; punctures of same size as those on head, sparser on disc, denser on sides, median smooth area behind middle present; base as in *misella*. Scutellum impunctate. Elytra three times longer than pronotum, punctures near humerus of same size and density as on sides of pronotum, less dense elsewhere on elytra; second interval multipunctate; costae convex or flat. Metasternum at least twice as long as hind femora are wide. Hind coxal plate margined at sides, truncate, the margin rather carinate. Pygidium densely punctured.

Front tibiae and middle and hind tarsi as in *misella*. Male genitalia as in figure 166 of *deserta*, except that the lobes are proportionately thinner, but actually larger; basal piece one and one-half times longer than lobes.

SEXUAL DIMORPHISM: The hind femora are inflated in the female, not in the male. The clypeus of the male has angles sharper and front margin more reflexed.

REMARKS: When Fall (1932) described four new species resembling his *chiricahuae* (*producta*, *pinalica*, *deserta*, *incuria*), he was not aware that only *chiricahuae* and *producta* (= *angularis*) had hairs on the clypeus and that these two did not have very elongate

basal pieces on the male genitalia as are present on the genitalia of the other three species. *Diplotaxis pinalica* is differentiated further from *chiricahuae* (which occurs also in Arizona and in the Pinal Mountains) by the more densely punctured elytra, especially on the humerus and the second interval, the more prominent, angulate canthi (fig. 37), and the sunken, less prominent eyes. Two specimens of *pinalica* have one or two hairs on the clypeus. Fall says also (p. 196) that the "distinct median smooth line behind the middle" in *pinalica* is not present in any of the allied species. However, I have found such a line or space in some specimens of *chiricahuae* as well as in others of the *trapezifera* group, but it is not present, or if so is not distinct, in the other members of the present group. Cazier (1940c, p. 135) also mentions this space for "*microps*," but not for "*recticanthus*," the type of which, however, has it also. One of the individuals from the Pinal Mountains has a long, narrow, smooth space, whereas some of the others have the space ill defined and more or less round. The fine punctulations of the interspaces noted by Cazier for *microps* and *recticanthus* are present in other forms of the group.

The type of *recticanthus*, and the type and paratype of *microps*, have been examined, and the type of the former has been compared with the type of *pinalica*; also the genitalia of the type of *recticanthus* have been compared with those of a topotype of *pinalica*. These comparisons seem to show that both *microps* and *recticanthus* are synonyms of *pinalica*, *microps* actually being the female.

SPECIES GROUP *SCHAEFFERI*

Diplotaxis schaefferi Fall

Figure 144

Diplotaxis schaefferi FALL, 1909, p. 33, pl. 1, fig. 9 (New Braunfels, Texas; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Similar in some characters (color, shape, long tarsi, short labrum, flat mentum) to many species of the *trapezifera* group, but lacking the hairs on the clypeus that characterize that group. Resembles also *pinalica* (*misella* group) but differs by having the front angles of the clypeus rounded, not

acute (they are also rounded in females of *pinalica*), a differently shaped pronotum (sides widest at, not behind, the middle and front angles not drawn forward), the eyes not sunk but level with the head, and the elytral costae virtually obscured by the dense maze of punctures.

RANGE: Texas. Only three specimens have been examined, the type, New Braunfels, one other male from "Texas," in the American Museum of Natural History, and a male from Llano, Texas, April, 1931, "det. Fall," in the Cartwright collection at the United States National Museum.

DESCRIPTION (MALE ONLY): Length, 7.5 to 8 mm. Color tawny or red. Head sloping gently to clypeal suture which is obliterated at middle, the fine, rather dense, and uniform punctures of head continuing onto clypeus. Clypeus without hairs, concave in front where margin is strongly reflexed, clypeus more than one-half of the length of head, front margin slightly emarginate between broadly rounded angles, sides converging to front without sinuation; canthi not angulate. Eyes not sunk, each eye one-fifth of the width of head. Antennae 10-segmented, club as long as funicle. Maxillary palpi with last segment not flattened basally. Mandibles not large. Labrum finely, densely punctured, not quite so long as, and level with, reflexed under side of clypeus, arched in front, slightly concave, sides not prominent. Mentum flat, anterior declivity not ridged and indicated only by a few long hairs.

Pronotum slightly wider than long, punctures of disc slightly larger and denser than those on head, sides widest at middle where subangulate, thence gently arcuate to obtusely angled front and hind angles. Scutellum with few punctures on sides. Elytra about three times longer than pronotum, punctured as on pronotum but more shallowly, punctures so dense and erratic that costae and intervals are not distinctly separated; second interval multipunctate; sutural interval with irregular double row of punctures; marginal hairs sparse, at middle about as long as width of a sutural interval; reflexed margins narrow. Abdomen not ridged. Metasternum between coxae almost twice the length of second abdominal segment. Hind coxal plate on sides truncate, but with slight

angular projection. Propygidium with spiracles not prominent and no groove above pygidium, but a line of punctures. Pygidium with large, irregular punctures.

Front tibiae with three equidistant teeth, apical tooth very long, basal tooth very small (just a slight angulation) and placed near middle. Hind femora not bulbous. Middle tarsi with first two segments equal in length, hind tarsi with first segment one-third shorter than second, hind tarsi longer than hind tibiae by length of entire claw segment, middle tarsi longer than middle tibiae by last two segments. Claws longer than one-half of claw segment, bent rather abruptly, toothed subapically, tooth shorter than claw. Genitalia about as in *confusa* (fig. 144).

SEXUAL DIMORPHISM: In males (only sex available) the longer hind tibial spur is narrow, about the same length as the first hind tarsal segment, the pygidium is retracted slightly, the fifth segment of the abdomen is slightly shorter than the fourth, and the hind tibiae have virtually no apical flare.

REMARKS: This apparently rare species (Fall reported three other specimens which I have not seen) seems to be allied to the two preceding groups as stated in the diagnosis. Fall (1909, p. 33) placed it in his revision next to *mentalis* because of the flat and non-ridged mentum, although he said it "does not look quite right in its present position." In this genus I believe that no single character, such as the mentum, can be used for the classification of all the species, because no matter which one is chosen, a strict adherence to it will result in grouping together species that seem not necessarily related. Fall himself was well aware of this difficulty (1909, p. 2).

The "very exceptional character" of "the irregularity of punctuation of the elytral costae" mentioned by Fall occurs also in quite a few Mexican species that were not known to Fall, in the *trapezifera* group as well as in some other groups.

SPECIES GROUP *JUQUILENSIS*

The two species placed in this group, *Diploptaxis juquilensis* Bates and *laevivertex* Bates, may not be closely related, but they have rather different male genitalia from those of other species, somewhat as in some members of the South American genus *Liogenys*.

They are both small species, with large eyes, small mandibles, apically cleft claws, the same narrow, elongate form, the elytra without visible marginal hairs, and sparingly punctured costae. The males of both forms have thickly fringed tarsal soles (almost hairy pads).

The type and syntypes of both forms have been examined, as well as 15 other specimens. Each of the species appears to be restricted geographically, one (*juquilensis*) to Oaxaca and the other to Guerrero.

Diplotaxis juquilensis Bates

Figure 169

Diplotaxis juquilensis BATES, 1888 (1887-1888), p. 162 (Juquila [Oaxaca], Mexico; lectotype, male, here designated from original pair of syntypes in British Museum).

DIAGNOSIS: Differs from *laevivertex* by having dense, not sparse, punctuation on the head, pronotum, and pygidium; the pygidium very large, flat, without swellings; the pronotum shorter, more transverse, with the widest part behind, not at the middle; and the sixth ventral segment large and exposed.

RANGE: Known only from Juquila in the southwestern mountainous section of the Mexican state of Oaxaca and from specimens without exact locality in Mexico. The 15 specimens examined are as follows: Juquila: three males, including the lectotype, and one female paratype; Oaxaca Province: four males; "Mexico": four males and three females.

DESCRIPTION OF LECTOTYPE, MALE: Length, 8 mm. Color tawny. Head gently declivous, finely and densely punctured. Clypeal suture obliterated at middle. Clypeus without hairs [some present in other specimens], longer than one-half of the length of head, broad, trapezoidal, punctures a little larger than those on head, front margin scarcely emarginate, slightly reflexed, angles broadly rounded, sides somewhat emarginate. Eyes large, each eye almost one-quarter of the width of head. Antennae 10-segmented. Maxillary palpi without dorsal impression on last segment. Mandibles small. Labrum slightly longer than reflexed under side of clypeus, somewhat flat, apparently impunctate, front margin arcuate. Mentum with declivity in an-

terior fourth posteriorly arcuate, margined, and pubescent.

Pronotum flat, transverse, punctures of disc of same size and sparseness as those on head, sides angulate from behind middle, where widest, to obtuse but sharp hind angles, and only slightly convergent to produced and acute front angles. Scutellum with a few punctures. Elytra almost four times longer than pronotum, punctures dense, larger than those on pronotum; second interval multipunctate; costae convex, with smaller, sparse punctures; marginal hairs, if present, not visible. Abdomen not ridged laterally, propygidium without groove. Pygidium large, partly hidden by overhanging elytra, with large dense punctures much larger than those on sides of abdomen.

Front tibiae bidentate, both teeth close together and in front of insertion of spur. Middle tarsi with first two segments equal in length, hind tarsi with first segment slightly shorter, hind tarsi longer than tibiae. Claws bent angularly, cleft subapically, tooth as long as claw. Genitalia as in figure 169; basal piece not examined.

SEXUAL DIMORPHISM: Males have long abundant hairs on all tarsal segments, the hairs usually thick enough to be called hairy pads; females have the tarsi less hairy. The longer spur of the hind tibiae is the same length as the first tarsal segment in males, longer in females. The hind tibiae in males are slightly concave or bent inward on the outer face, also quite hairy on their inner edges. Males have the pygidium somewhat retracted because of their shorter fifth abdominal segment, and more transverse than that in females.

VARIATIONS FROM LECTOTYPE: The size of specimens ranges from 7.5 to 9 mm., the color from tawny to piceous, some specimens having coppery and aeneous sheen. In some specimens the labrum is flat in front and finely punctured; in some the clypeus has hairs and the front margin either emarginate or truncate; in some the punctures fill the scutellum; in one specimen the costae of the elytra appear to be impunctate.

REMARKS: The hairs on the clypeus, which seem out of place in this species, appear to be present only behind the front border and are quite sparse in those specimens in which they

show; no hairs were noted at the time of examination of the type.

This species has somewhat the aspect of head and clypeus of the rare *schaefferi* from Texas, but has different elytra, claws, male genitalia, and other characters. It is much more coarsely punctured than the tiny *parvula* Burmeister, which occurs also in Juquila, and which differs further from *juquilensis*, among other characters, by having only one row of punctures on the second elytral interval. Another species with about the same bidentate front tibiae is *macrotarsus* (Oaxaca and south into Central America), but it differs from *juquilensis* by having large tarsal segments, short elytra, different claws, and bulbous hind femora. (The two last-named species are in the *trapezifera* group.)

The two species of the Neotropical *ohausi* group resemble *juquilensis* by having sparse hairs on the clypeus and hairy tarsal soles in the males; and one of these (*zeteki*) has also peculiar angular apices on the male genitalia and the third tooth of the front tibiae obsolete in some specimens. However, in addition to the different genitalia and geographical range, *juquilensis* differs from the species of the *ohausi* group by having acute front angles on the pronotum and the sides of the clypeus not sharply indented in front of the eyes.

In a number of specimens, as remarked by Bates, the apex of the elytra projects over the pygidium and conceals part of it. The large, exserted, sixth ventral segment is present in a number of other species of the genus (*pilifera* and *puberea* groups), although it is usually not noticeable in *Diploaxis*.

***Diploaxis laeivertex* Bates**

Figures 170, 171

Diploaxis laeivertex BATES, 1889, p. 397 (Omiteme, Guerrero, Mexico; type, male, in the British Museum).

DIAGNOSIS: This small, glabrous, and reddish or tawny species is distinguished from all others in the genus by the characters of the pygidium, which is either sparsely punctate and slightly bicallose or virtually non-punctate and markedly bicallose. The pronotum is also sparsely punctured; it is narrower at the base than the elytra, has acute front angles, and appears more quadrate than transverse.

RANGE: Known only from the type locality in the state of Guerrero, southwestern Mexico. I have examined three males, including the type, and two females, all from Omiteme, 8000 feet, taken in July and August. Omiteme is slightly west and south of Chilpancingo; it is not listed on the millionth map of Hispanic America (American Geographical Society, 1945), but is shown on map number 5 in the introductory volume of the "Biologia" (Godman, 1915).

DESCRIPTION: Length, 7 to 8 mm. Color tawny (one specimen dark red). Head with large impunctate areas on vertex, front finely and sparsely punctured. Clypeal suture not evident. Clypeus without hairs, a little less than one-half, or even one-third (type), of the length of head, finely and densely punctured, front margin rounded from side to side, slightly reflexed, truncate between broadly rounded angles, side margins not sinuate. Eyes, antennae, and mandibles (palpi not examined) as in lectotype of *juquilensis*. Labrum slightly longer than, and on same level as, reflexed under side of clypeus, flat in front, somewhat concave behind, densely punctured, front margin nearly straight. Mentum flat, with anterior declivity scarcely indicated by a few hairs. Pronotum appearing quadrate but actually wider than long, narrower at base than base of elytra, finely and sparsely punctured (as on head), sides widest at middle, evenly rounded to small, acute front angles and to obtuse hind angles, the latter slightly depressed within. Scutellum, elytra, abdomen, and propygidium as in *juquilensis*, except second interval of elytra unpunctate in front and costal punctures difficult to see because of shining surface. Pygidium large, transverse, with only a few punctures, either slightly or strongly concave longitudinally at middle or near apex, and correspondingly bicallose at sides. Front tibiae as in *juquilensis* or with small third tooth. Middle and hind tarsi and claws as in *juquilensis*. Male genitalia as in figures 170 and 171; basal piece not examined.

SEXUAL DIMORPHISM: Males as in *juquilensis*, except their hind tibiae are neither bent nor hairy within, and the first segment of the hind tarsi is nearly one-half as short as the second.

REMARKS: Bates placed this species be-

tween his *sinuaticeps* (= *simplex* Blanchard) and *cribriceps*, not far from *juquilensis*. It resembles the latter in its narrow, elongate form and in the hairy tarsi of the male, but the punctuation of the head, pronotum, and pygidium is unusually sparse in this species, dense in *juquilensis*, and the male genitalia (figs. 169, 170) differ slightly. The general appearance is about that of *languida* LeConte from the southeastern United States, but that species has very wide hind femora and nine-segmented antennae.

The double swellings of the pygidium appear to be unique in *laevivertex*, but they are not always so marked as in one of the females; they are best seen from a three-quarter view. The very short first segment of the male hind tarsi recalls *pilifera*, a small, dorsally hairy species which has (in the female only) also an unusual pygidium that is entirely concave.

SPECIES GROUP *AMECAMECA*

Diplotaxis amecameca Vaurie, new species

Figure 172

TYPE MATERIAL: Type, male, *Amecameca* [Mexico], Mexico, June 6, 1897, Koebele collection, and two female paratopotypes, in the American Museum of Natural History; two female paratypes, one from "Amecameca, Morelos" [should be state of Mexico], collected by Höge, in the British Museum, and one from Ameca [=Amecameca, probably, although there are places named "Ameca" in the states of Jalisco, Nayarit, and Zacatecas], J. Flohr, collector, in the Zoologisches Museum, Berlin.

DIAGNOSIS: This narrow, long-legged species which resembles superficially *consentanea* and some other small members of the *trapezifera* group (although it has no hairs on the clypeus), has a number of unusual characters: females have rather bulbous hind femora that are sinuate on the lower edge, and apically rounded hind tibial spur (longer of the two spurs); males have the longer tibial spur on the middle legs very short and curved; both sexes have very long tarsi and tarsal segments and long elytra.

RANGE: The only exact locality known is Amecameca which is southeast of Mexico City on the central plateau, at about 8000 feet.

DESCRIPTION OF TYPE, MALE: Length, 8 mm. Color dark red. Head convex and abruptly declivous to clypeus, finely and sparsely punctured on top, finely and densely in front. Clypeal suture more or less obliterated at middle. Clypeus without hairs, nearly as long as head, punctures denser than those on head, front margin slightly emarginate between broadly rounded angles, broadly reflexed, sides slightly bent inward in front of eyes, but canthi not prominent. Eyes large, not sunk, each eye about one-fourth of width of head. Antennae 10-segmented. Maxillary palpi not impressed at base of last segment. Mandibles small. Labrum densely punctured, same length at middle as reflexed under side of clypeus, slightly concave, the sides advanced, front margin scarcely arcuate. Mentum virtually flat, the apical declivity indicated by its arcuate and pubescent hind margin.

Pronotum at base narrower than base of elytra, flat, transverse, punctures of disc slightly larger and sparser than those of front of head, sides widest behind middle where subangulate, thence oblique to right-angled front angles and sinuate to obtuse hind angles, middle base with longitudinal impunctate space. Scutellum punctured at base. Elytra three and one-half times longer than pronotum, punctures as sparse as those on pronotum, slightly larger; second interval multipunctate; costae slightly convex and with smaller, sparse punctures; marginal hairs not visible; epipleurae not widened apically. Metasternum slightly depressed at middle, twice as long, between coxae, as second abdominal segment. Propygidium not grooved, spiracles not at all prominent. Pygidium with large, coarse, deep punctures. Abdomen not ridged laterally.

Front tibiae with three teeth in front of middle. Hind femora with one row of punctures between submarginal rows, narrower than length of second abdominal segment. Middle tarsi with first segment one-third longer than second, segments 1 and 2 combined as long as entire middle tibiae. Hind tarsi with first segment shorter than second, hind tarsi longer than tibiae. Claws bent at right angles, cleft subapically, tooth about as long as claw. Genitalia as in figure 172; basal piece torn.

SEXUAL DIMORPHISM: The male (type) differs from females by having the hind tibiae scarcely widened to apex (not at all flared out), the hind femora not sinuate on lower edge as they are in females, the long spur of the hind tibiae acuminate, not rounded off and shorter than the first hind tarsal segment, not longer. There is little sexual difference in the shape of the pygidium or in the relative length of the fifth segment of the abdomen.

VARIATIONS FROM TYPE: The length of the paratypes varies from 8 to 9 mm. The head is not always abruptly declivous; the suture of the clypeus is distinctly impressed and slightly sinuate in all the paratypes; the eyes appear somewhat smaller in the paratypes; two of the paratypes have the sides of the pronotum even more angulate than does the type; a few short marginal hairs are present at the base of the elytra in the paratypes.

REMARKS: The elongate form, long, thin legs, very short tibial spurs, and even the genitalia, of the male are quite similar to those found in males of *juquilensis* (Oaxaca), but that species differs notably by having the front tibiae bidentate and the disc of the clypeus hairy in both sexes, and the tarsal segments abundantly hairy in the male. In the male of *amecameca* the middle tarsi are longer than the middle tibiae by the last three segments and the first segment of the middle tarsi is almost four times longer than the longer of the tibial spurs (in most species and in the female of this species it is no more than perhaps two or three times longer). The claws as well as the tarsi and tarsal segments are long.

This species is somewhat like *rosae* (*marginicollis* group), from northwestern Mexico, in the long tarsi and lack of marginal hairs on the elytra, but it differs by having small, not bulbous, mandibles, long clypeus, long elytra, and shorter labrum than *rosae*. The slightly bulbous hind femora of the female are not nearly so exaggerated as they are in the tiny *femoralis* (*trapezifera* group).

The paratype from the British Museum is labeled "Sp. figured" and has a reversed label, "*Listrochelus oblongus* Bates." An additional label in the handwriting of Gilbert J. Arrow and signed by his initials explains the situation, i.e., "*Diplotaxis* sp. confounded with *Listrochelus oblongus* and figured as ♂." The

specimen is a female and is figured in Bates (1887-1888, table 10, fig. 7) as depicting *Listrochelus oblongus*, but it is not mentioned in the text.

SPECIES GROUP *ERRANS*

Diplotaxis errans Fall

Figures 52, 53, 173, 174

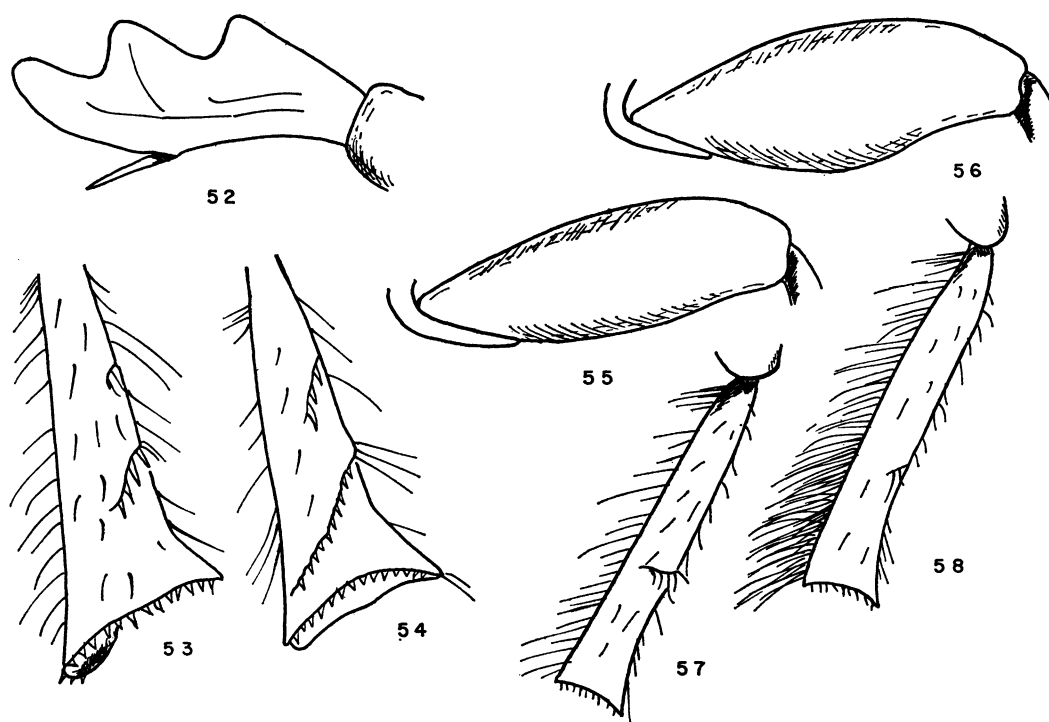
Diplotaxis errans FALL, 1909, p. 84, pl. 1, fig. 50 ("Texas"; type, female, in the Academy of Natural Sciences of Philadelphia).

Diplotaxis unguis CAZIER, 1940b, p. 137 (Eagle Pass, Texas; type, female, in the United States National Museum). New synonymy.

DIAGNOSIS: Distinguished from all other species in the genus by the following combination of characters: front tibiae very wide, short, with large, equidistant teeth, of which the basal one is slightly behind the middle (fig. 52); hind femora very wide, short, those of female by actual measurement the same width as the length of the second and third abdominal segments combined; hind tibiae carinate near apex, strongly expanded from base to apex (fig. 53); eyes small, rather sunken; clypeus and head, but not rest of dorsum, hairy, front margin of clypeus scooped out (about half of clypeus is turned backward); and male genitalia excised at apex (figs. 173, 174).

RANGE: The only locality known is Eagle Pass in southeastern Texas, on the Mexican border. I have examined two specimens from Eagle Pass, a female and a male (the type and paratype, respectively, of *unguis*), taken on March 30, 1908, and the type of *errans*, a female, without further locality than "Texas."

DESCRIPTION: Length, 9 to 11 mm. Color tawny. Head slightly or abruptly declivous to clypeus, punctures exceedingly dense and with minute hairs emerging. Clypeal suture obliterated at middle. Clypeus hairy, trapezoid, deeply concave, nearly as long as head, punctured about as on head, front margin truncate, angles obtuse but blunt, sides faintly sinuate to the angulate canthi, both front and sides broadly, deeply reflexed. Eyes small, rather sunk, each about one-fifth to one-sixth of the width of head. Antennae 10-segmented, club no longer than funicle. Maxillary palpi without depression on last segment. Mandibles small. Labrum slightly



FIGS. 52-58. Legs of some specimens of *Diplotaxis*. 52. Right front tibia of *D. errans*. 53. Left hind tibia of *D. errans*, type, female. 54. Left hind tibia of *D. corbula*, female, showing exposed corbel and oblique carina. 55. Left hind femur of *D. blanchardi*, female. 56. Left hind femur of *D. urbana*, female. 57. Left hind tibia of *D. blanchardi*, male. 58. Left hind tibia of *D. urbana*, male, showing abundant inner hairs.

concave behind, level in front, shorter than the reflexed under side of clypeus; finely, densely punctured. Mentum flat, the apical portion marked by slight ridge and line of pubescence.

Pronotum much longer than head and clypeus combined, nearly as long as it is wide, punctures of same size as those on head but sparser, at least on disc; sides strongly arcuate (subangulate) at middle, thence oblique to obtuse front and hind angles. Scutellum punctured sparsely on sides and base. Elytra nearly three times longer than pronotum, punctures twice larger, and sparser; second interval irregularly unipunctate; costae convex or flat, with smaller, sparser punctures than those on intervals; marginal hairs short at middle third. Metasternum slightly depressed at middle base. Distal margin of hind coxal plate truncate, margined, the edge carinate. Pygidium sparsely punctured.

Front tibiae very stout and broad, nearly

twice wider than the middle tibiae, the teeth deeply cut, as long as one-half of the width of the tibiae, equidistant, the basal tooth situated behind the middle. Middle tibiae with apex rather sinuate. Hind tibiae strongly widened to apex (fig. 53). Middle tarsi with first segment slightly longer than second, hind tarsi with it slightly shorter than second. Hind femora as wide as or wider than the second and third abdominal segments combined. Claws gently curved, toothed subapically, tooth much shorter than claw. Male genitalia as in figures 173 and 174; basal piece a little longer than the lobes.

SEXUAL DIMORPHISM: The relative lengths and widths of the hind tibial spurs, and of the fourth and fifth abdominal segments, are the same in both sexes. The female differs notably from the male by having very wide, inflated, and bulbous hind femora (see diagnosis) and much wider hind tibiae.

REMARKS: This species is rare in collec-

tions, for I have seen only three specimens of thousands of the genus. Fall (1909) called it a "very distinct species," without saying how it was distinct. It is unusual in the genus not only because of the leg characters as given in the diagnosis, combined with the extremely strongly reflexed and hairy trapezoid clypeus, but also because of the different male genitalia. The legs are not unique, however, as *beyeri* Schaeffer (Texas; northern Mexico), which follows, has similar front tibiae, and some members of the *subcostata* group have similar hind tibiae. Superficially, *beyeri* and *errans* resemble each other in color, in the parallel, narrow shape, in the large pronotum, and in the strongly advanced clypeus. The hind femora and tibiae of *beyeri* are narrower, the pronotum is more convex, the eyes are large, not small as in *errans*, the elytra are regularly punctured, not confusedly so, and the clypeus has no hairs. Cazier (1940b) considered *ungula* (= *errans*) closely allied to *beyeri* and *sulcatula*; Fall, in the sequence of species in his revision, placed it after *polita* (Baja California) and before *truncatula* (*polita* has also a hairy clypeus, *truncatula* has the abdomen ridged). I find it most similar to *concava* (Guerrero) and *sonora* (Sonora and Sinaloa) of the *trapezifera* group, resembling the former in the head, clypeus, and pronotum but differing in the stout, large legs; it resembles *sonora* somewhat in respect to the legs, but has longer pronotum, elytra, and metasternum, and more reflexed clypeus. The male genitalia of *errans* differ from those of all species mentioned by having the apices of the lobes cut out at the inner apex as shown in figure 173.

Through the courtesy of Drs. James A. G. Rehn and Harold J. Grant, Jr., of the Academy of Natural Sciences of Philadelphia, I was able to examine the type of *errans*. Comparison of this female with the female type of *ungula* shows them to be the same species. The type of *errans* is smaller (9 mm.) than that of *ungula*, which is 11 mm., but all the salient characters are the same. Fall (1909, p. 84) calls the mentum "distinctly margined," but I believe he mistook the front margin of the mentum itself, which is pulled back in the type specimen, for the rear margin of the declivity.

SPECIES GROUP *BEYERI*

Diplotaxis beyeri Schaeffer

Figure 175

Diplotaxis beyeri SCHAEFFER, 1907, p. 66 (Esperanza Ranch, Brownsville, Texas; lectotype, male, here designated from two syntypes in the United States National Museum). FALL, 1909, pl. 1, fig. 27 (clypeus and claw).

DIAGNOSIS: The large, convex pronotum (although more exaggerated), the elytra, with their single row of punctures on the second interval, and the male genitalia are similar to those of *sulcatula* and *punctipennis* (*frondicola* group), but the eyes are much larger than in those species, the head is flat, and the clypeus differs by being emarginate and strongly reflexed in front, its sides strongly indented in front of eyes and nearly parallel to the front margin. The hind femora are swollen at the middle, the scutellum is impunctate, and the pronotum is humped and convex. (See also Remarks under *errans*.)

RANGE: Southern Texas and the north-eastern Mexican states of Nuevo Leon and Coahuila. A total of 18 specimens has been examined (see Appendix).

DESCRIPTION: Length, 8 to 12 mm. Color tawny, with black margins on clypeus, base of pronotum, and, in some specimens, also the suture of the elytra. Head flat in front, declivous, finely and densely punctured. Clypeal suture impressed. Clypeus without hairs, punctured as on head, as long as head in many specimens, including type material, but shorter in some; margins strongly, deeply, broadly reflexed, slightly emarginate in front (truncate in lectotype), laterally broadly lobed, side margins nearly parallel and in most specimens angularly indented in front of eyes. Each eye about one-quarter of the width of head. Antennae 10-segmented, club as long as funicle. Maxillary palpi (hidden on lectotype) with flattened basal area on last segment. Mandibles small, slender. Labrum very short and narrow, only one-half as long as reflexed under side of clypeus (about same length in lectotype), strongly curved in front, slightly concave at center base. Mentum rather flat but having short declivity in apical fourth that is posteriorly slightly ridged and pubescent.

Pronotum extremely convex, almost humped, about three and one-half times wider than front clypeal margin, punctures same size as those on head and clypeus but sparser, sides arcuate at middle, evenly rounded to obtuse front and hind angles which are not impressed, base at middle depressed in some specimens. Scutellum impunctate or with one or two punctures. Elytra not much more than twice longer than pronotum, punctures larger and sparser than those on pronotum; costae not very noticeable and with only a few tiny, widely spaced punctures; second interval unipunctate; marginal hairs, if visible, exceedingly short and sparse. Metasternum between coxae at least twice as long as second abdominal segment. Hind coxal plate laterally truncate but with small angle in front that extends onto elytral margins. Pygidium very large and with large, deep, irregularly spaced, sparse punctures (punctures confluent in some specimens). Propygidium not grooved, or grooved indistinctly, spiracles not prominent. Sides of abdomen not ridged.

Front tibiae with three very large equidistant teeth, third or basal tooth at or even behind middle. Hind femora sinuate and inflated. Middle tarsi with first two segments about equal in length or first segment a little longer, hind tarsi with first segment shorter than second, hind tarsi slightly longer than hind tibiae. Hind tibiae with both setose carinae distinct, the more apical one extending diagonally across face of tibiae. Claws bent, but not so abruptly as in some species, cleft nearer middle than apex, tooth shorter than claw. Male genitalia as in figure 175 of *sulcatula*; basal piece same length as lobes.

SEXUAL DIMORPHISM: Males have longer and less abruptly bent claws than do females, and a smaller tooth on the claw (in the lectotype the tooth is virtually obsolete). Males have the first hind tarsal segment as long as the longer tibial spur, not shorter as in females. Males have virtually no widening of the apex of the hind tibiae, whereas females have a distinct apical flare.

REMARKS: This is one of those distinctive species that once seen is not forgotten. It is perhaps not rare, but it is certainly not common in collections. The majority of specimens

examined have been males. Although Schaeffer in his original description did not compare *beyeri* with any other species, Fall (1909, pp. 58-60) placed it in his classification after *sulcatula*. Viewed from above, it certainly bears some resemblance to *sulcatula*, except for the emarginate clypeus and large eyes. These two characters separate it also from *errans*, which differs further by having the clypeus hairy, the tibiae wider and stouter, and different male genitalia (fig. 173).

SPECIES GROUP *CONVEXILABRUM*

Diplotaxis convexilabrum Vaurie and Cazier

Figures 102, 193

Diplotaxis convexilabrum VAURIE AND CAZIER, 1955, p. 12, figs. 1, 3C (Nombre de Dios, Durango; type, male, in the American Museum of Natural History).

DIAGNOSIS: Although the head and rounded clypeus are similar to those of some species of the *frondicola* group (*lengii*, *blanchardi*, *urbana*), this species differs from them and from all others of the genus by having the entire labrum convex, very short and very narrow, like a miniature sausage but tapering to the sides (fig. 102). Additional characteristics include a long antennal club; long, prominent declivity of the mentum with rear edge arcuate, margined, and pubescent; thin, small mandibles; and bent and apically cleft claws.

RANGE: Western Mexico from southern Durango and Zacatecas south to Guadalajara in the state of Jalisco and east to Guanajuato. A total of 36 specimens has been examined (see Appendix).

HABITAT: A specimen collected at Nombre de Dios, Durango, in August, 1951, is labeled "*Asclepias*" (milkweed).

DESCRIPTION: Length, 8 to 9.5 mm. Color dark red to black. Head finely, densely punctured, descending obliquely to clypeal suture which is obliterated at middle. Clypeus from one-third to one-half of the length of head, punctured about the same as head, front margin broadly reflexed, truncate between rounded angles (more or less rounded from side to side). Each eye one-fifth of the width of head. Antennae 10-segmented, club as long as funicle. Maxillary palpi with last segment

not impressed. Mandibles small. Labrum convex throughout, advanced from and not longer than reflexed under side of clypeus, front margin scarcely curved. Mentum rather flat, but its declivity in apical half with strongly margined, arcuate, and pubescent rear margin.

Pronotum with punctures sparser than those of head, sides widest at middle, evenly arcuate to obtuse, unimpressed front and hind angles, base not impressed. Scutellum with variable punctuation. Elytra almost three times longer than pronotum, with larger punctures than on pronotum, second interval multipunctate, costae with smaller punctures, marginal hairs scarcely visible, reflexed margins narrow throughout. Metasternum twice as long as first abdominal segment. Hind coxal plate slightly angulate at sides. Pygidium with variable punctuation, but sparse in most specimens. Propygidium grooved, spiracles not prominent.

Front tibiae with all three teeth in front of middle, the two apical ones closer together. Hind femora not wider than second abdominal segment is long. Middle tarsi with first segment longer than second, hind tarsi with it shorter. Hind tarsi as long as hind tibiae. Hind tibiae with setose carinae transverse. Claws bent abruptly, cleft subapically, tooth as long as claw and close to it. Male genitalia about as in figure 193 of *frondicola*, but much larger; basal piece shorter than lobes.

SEXUAL DIMORPHISM: As given for *frondicola*.

REMARKS: There is no basal impression on the pronotum as there is in both *blanchardi* and *urbana* of the *frondicola* group mentioned in the diagnosis. As for the resemblance to *lengii*, *convexilabrum* differs from it, in addition to the different labrum, by having the third tooth of the front tibiae in front of the middle, not submedian; finer pronotal punctuation, different shape of pronotum; and broader scutellum.

Specimens seen since the species was described have extended the range to two states farther south.

SPECIES GROUP *FRONDICOLA*

The following 25 species are included in this group in the order in which they are listed:

SECTION 1: *Diplotaxis frondicola* Say; *basalis* Fall; *thoracica* Fall; *curvaticeps* Fall; *lengii* Fall; *foveicollis* Moser; and *dubia* LeConte.

SECTION 2: *Diplotaxis harperi* Blanchard; *texana* LeConte; *fulva* LeConte; *blanchardi* Vaurie; *urbana*, new species; *punctatorugosa* Blanchard; and *brevisetosa* Linell.

SECTION 3: *Diplotaxis corvina* LeConte; *sulcatula* Fall; *punctipennis* LeConte; *trementina* Fall; *puncticeps* Moser; *muricata* Schaeffer; and *fimbriata* Fall.

SECTION 4: *Diplotaxis pacata* LeConte; *subangulata* LeConte; *rufiola* Fall; and *carbonata* LeConte.

Perhaps some of the above sections might be considered as groups, but there seems not to be a sufficient number of measurable characters to set them off as groups, especially as even the groups themselves in this genus are not always clear-cut. Approximately 8000 specimens of this group have been examined, including the types (or syntypes) of all the forms except *frondicola* of Say, *harperi* and *punctatorugosa* of Blanchard, *fulva* of Robinson, and *sparsesetosa* of Schaeffer.

The group is composed of species that are placed together on the rather tenuous basis of the shape of the clypeus and the size of the labrum. The labrum is at least as long as the reflexed under side of the clypeus, in many species as much as twice as long, and it is also very wide. The front margin of the clypeus is more or less rounded from side to side in a semicircle, or flattened semicircle, or in a vague hemihexagon (figs. 39–43), not including the ocular canthi which may be angulate or emarginate in front of the eye. In some individuals there is a slight emargination at the middle of the clypeus that does not, as a rule, destroy the rounded effect. These individuals should not be confused with the large species of the *brevicollis-haydenii* group, which have the clypeus usually distinctly emarginate in front and are characterized further by having a furrow or transverse depression across the reflexed under side of the clypeus (this furrow is not present in the *frondicola* group except vaguely in some specimens of *sulcatula*, *punctipennis*, and *puncticeps*).

Some of the species of the *simplex* group¹ (central and southern Mexico and Guate-

¹ In part 1 of the revision (Vaurie, 1958).

mala) resemble some of the species of this group in their long and large labrum, stout and bulbous mandibles, and rounded angles of the clypeus (although the clypeal margin is not rounded from side to side in most species), but that group is no more homogeneous than the *frondicola* group is homogeneous, so that it is perhaps best to keep them separate. As they now stand, the difference in the geographic ranges is the only criterion truly distinguishing one group from the other. The species of the *marginicollis* group, also *maura* and those of the *moerens* group (United States and northern Mexico) have a large labrum also, but they either have a distinctly emarginate clypeus, not rounded in front, or they have the labrum deeply cleft or bilobed.

CHARACTERS OF THE *frondicola* GROUP

The species range in length from 6 to 12 mm. The only significant characters that are the same for all species are: the clypeus has rounded front angles, the antennae are 10-segmented, the front tibiae are tridentate, and the abdomen is rounded, not carinate at the sides. In addition, however, there are a number of characters that are present in the majority of species. Thus the clypeus has no hairs except in the two dorsally hairy species (*brevisetosa* and *muricata*), although an occasional individual of *subangulata* may show sparse hairs just behind the front margin. The mandibles are large, stout, and bulbous in many species, but less stout and even narrow in others. The labrum is especially long and rather flat in some (*punctatorugosa* and *blanchardi*), long and concave in some (*corvina*, *muricata*, and *fimbriata*), less long and rather concave (*frondicola* and others), somewhat convex (*sulcatula*, *puncticeps*, and *punctipennis*), and less long and rather flat in *subangulata*. The eyes in most species are widely spaced, appearing small (but less small in *foveicollis*, *blanchardi*, and *urbana*), and, seen from beneath the head, they approach closely the gular region and the insertion of the antennae. In some specimens with partially reduced wings, however (*corvina*, *muricata*, and *fimbriata*), the eyes are somewhat farther removed from the gular region, by slightly more than the width of the antennae. The

palpi, scutellum, hind coxal plate, propygidial groove, legs, and claws vary among or within species.

The males, and occasionally the females, of some species have the soles of the tarsi, in all or in part, either with hairs longer than usual in the genus, or with distinct hairy pads (*thoracica*, *dubia*, *fulva*, *urbana*, and *brevisetosa*).

Two species (*brevisetosa* and *muricata*) have hairs on the dorsum; three species (*brevisetosa*, *muricata*, and *fimbriata*) have both normal and short-winged individuals in some of the same populations. Sixteen of the 25 species have short marginal hairs on the elytra, four have very long hairs, and five have hairs of about medium length. The majority of species have the tarsal claws cleft near the apex of the claw.

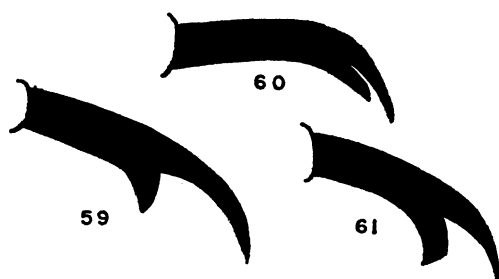
According to the information available on the ecology of these species, the western species in sections 3 and 4 apparently frequent shrubs and weeds, whereas the eastern and central species of sections 1 and 2 occur principally on deciduous trees. One of these at least (*frondicola*) is common on pecans, but whether as a pest or not, I do not know. Notations on habitat are given for the following species: *frondicola*, *harperi*, *blanchardi*, *punctatorugosa*, *brevisetosa*, *fimbriata*, *subangulata*, and *rufiola*.

DISTRIBUTION OF THE SPECIES

All the species but one (*foveicollis*) occur in the United States, and many of these occur also in northern Mexico, but the ranges of only three (*carbonata*, *curvaticeps*, and *puncticeps*) extend as far south as the states of Jalisco, Guanajuato, Hidalgo, and Puebla. Three species (*fimbriata*, *pacata*, and *subangulata*) occur also in Baja California. Only one species (*subangulata*) reaches as far north as southern Canada. Although some of the species are apparently restricted in their distribution to one or two states, others are wide ranging, as *subangulata*, *frondicola*, *harperi*, *blanchardi*, *carbonata*, and *rufiola*. *Frondicola* and *harperi* have been taken in at least 20 of the eastern and central states, and *subangulata* ranges from British Columbia and 10 other western states into southern Baja California, Sonora, and Chihuahua in Mexico.

KEY TO THE SPECIES OF THE *frondicola* GROUP¹

1. Dorsum hairy (hairs of elytra at least as long as one-half of distance between punctures) 2
Dorsum glabrous or with minute hairs that scarcely emerge from the depths of the punctures 3
2. Medium to large (8 to 12 mm.); head with all punctures touching; second interval of elytra unipunctate (fig. 1); New Mexico, Arizona, Texas, and northern Mexico *muricata*
Small (6 to 7 mm.); head with punctures distinctly separated; second interval of elytra multipunctate; Texas only *brevisetosa*
3. Tarsal claw with ungual tooth virtually median, as in figure 59 of *pacata*, and



FIGS. 59-61. Tarsal claws of some *Diplotaxis* (*frondicola* group). 59. *D. pacata*. 60. *D. rufiola*. 61. *D. carbonata*; characteristic also of *D. subangulata*.

- claw scarcely curved 4
Tarsal claw with apex of ungual tooth closer to apex than to middle of claw (figs. 60, 61) and claw usually bent apically 9
4. Marginal hairs of elytra short, no more than one-quarter of the length of scutellum; not occurring in California *sulcatula* in part
Marginal hairs of elytra as long as or longer than scutellum; California and elsewhere 5
5. Last segment of maxillary palpi at base flattened but not impressed; many specimens with large transverse impressions on sides of middle of pronotum; pronotum and pygidium shallowly, finely, often sparsely, punctured; Arizona, Colorado, Nevada, California, and Baja California *pacata*

¹ Some species included in the key belong in other groups and are so marked.

- Last segment of maxillary palpi distinctly impressed; pronotum without transverse impressions; pygidium and often pronotum deeply, coarsely, and densely punctured 6
6. Front of head transversely tumid from eye to eye; Canada south to northern Mexico, including Baja California, east to Kansas and Texas *subangulata* in part
Front of head either flattened or uniformly convex 7
7. Labrum finely and shallowly, if at all, punctate; males with normal hairs on abdomen and inner sides of hind legs; California; Baja California *fimbriata*
Labrum coarsely and rugosely punctured, appearing granular; males with dense, long, yellow hairs on center of abdomen and inner edges of hind femora and tibiae; Arizona; Sonora, Mexico 8
8. Pronotum convex, shining; front of head descending abruptly to clypeus, surface convex; males with scattered lateral hairs on front tarsi, hind tibiae on inner edge straight, genitalia acuminate at apex *brevidens*²
Pronotum rather flat, sericeous, often with longitudinal crease at center; front of head gently sloping to clypeus, surface flat; males with long, dense, lateral hairs on front tarsi, hind tibiae expanded within at apex and lobes of genitalia truncate and notched at apex *illustris*³
- 9(3). Marginal hairs of elytra at middle (not at base) as long as scutellum (more than one specimen should be examined) 10
Marginal hairs of elytra at middle shorter than scutellum (not or scarcely longer than width of a sutural interval) 16
10. Pronotum with front and hind angles impressed within; 10 to 12.5 mm. *parallela*⁴
Pronotum with angles not impressed; size various 11
11. Maxillary palpi with last segment not impressed basally (may be flattened slightly); pygidium usually sparsely, minutely, and shallowly punctured; color usually pale tawny *rufiola*
Maxillary palpi with last segment dis-

² This species is in the *brevidens* group discussed in part 1 (Vaurie, 1958).

³ This species is in the *brevidens* group discussed in part 1 (Vaurie, 1958).

⁴ See *brevicollis* group for this species.

- tinctly impressed at base; pygidium densely, or at least coarsely and deeply, punctured (punctures as large as largest elytral punctures); color usually dark red or black 12
12. Second interval of elytra with single row of large punctures (fig. 1); male genitalia as in figure 202; sides of pronotum strongly subangulate; front of head broadly, coarsely, transversely tumid (last two characters not constant) *subangulata* in part
Second interval of elytra with double or triple rows of punctures (fig. 1); male genitalia as in figures 150, 204, 207; sides of pronotum usually less strongly angulate; front of head usually only slightly, if at all, tumid 13
13. Front margin of clypeus distinctly longer than either side margin; eyes not sunk; male with one of each pair of front claws twice as large as the other (figs. 97, 98); Baja California . . . *anthracina*¹
Front margin of clypeus usually not longer than either side margin; eyes sunk below level of front of head; male with front claws equal in size; Baja California and elsewhere 14
14. Arizona, and Sonora, Mexico; male with outer claw of middle tarsus expanded as in figure 73 *planidens*²
Baja California or extreme southern California; male with claw of middle tarsus normal 15
15. Southern Baja California (Santa Rosalia to the Cape) (fig. 44); clypeus shallowly or broadly emarginate in front, rounded angles prominent; each eye nearly one-fourth of width of head across front; males with long, bristly, golden hairs on soles of all tarsi *australis*³
Northern Baja California and southern California south to vicinity of Santa Rosalia (fig. 44); clypeus rounded off, not or scarcely emarginate in front, angles not prominent; each eye one-fifth or one-sixth of width of head; males with long bristly hairs on segments 1 and 2 of hind tarsi only . . . *missionaria*⁴
- 16(9). Species from Texas, Arizona, New Mexico, California, or northwestern Mexico (Sonora, Chihuahua, Coahuila) with following characters: elytral punctures (except those of first broad interval) in fairly uniform single rows (not densely or confusedly punctate); front tibiae with basal tooth at middle of tibiae and, in some cases, almost as large as either of two apical teeth; maxillary palpi with last segment impressed or distinctly flattened; clypeus (in three of four species) with front third broadly reflexed 17
Species not agreeing in all of above statements 20
17. Spiracles on sides of propygidium (fig. 3) sharply elevated, crater-like; metasternum between middle and hind coxae scarcely longer than second abdominal segment; clypeal suture deeply impressed; hind tarsi with first segment distinctly longer than second; occurring west of Texas *corvina*
Spiracles on propygidium flat, not prominent; metasternum at least one and one-half times (usually twice) longer than second abdominal segment; clypeal suture obliterated at middle or but weakly impressed; hind tarsi with first segment same length as or shorter than second; Texas and elsewhere 18
18. Claws curved gently, tooth only slightly in front of middle (fig. 5); middle tarsi longer than middle tibiae by length of last two segments; United States and Mexico *sulcatula* in part
Claws bent abruptly, tooth close to apex (figs. 6, 61); middle tarsi scarcely longer than middle tibiae; United States 19
19. Pronotum with punctures of disc well separated (by twice their diameter in most specimens); clypeus short (one-half of length of head); hind tarsi shorter than hind tibiae; Texas and elsewhere *trementina* in part
Pronotum punctured densely (except for impunctate longitudinal area that is not always present); clypeus long (nearly as long as head); hind tarsi as long as or longer than hind tibiae; Texas *punctipennis*
- 20(16). Head behind clypeus transversely strongly ridged, at least at sides; pronotum with surface abruptly bulbous at middle of sides; bases of both pronotum (within hind angles) and elytra (within humerus) distinctly excavate or concave; front tibiae in most specimens bidentate; Rhode Island south to Florida, west on Gulf to eastern Texas and

¹ See *planidens* group for this species.

² See *planidens* group for this species.

³ See *planidens* group for this species.

⁴ See *planidens* group for this species.

- southeastern Oklahoma
 *punctatorugosa*
 Not exactly as above 21
21. Base of elytra within humerus distinctly impressed and tarsi very thickly hairy below in both sexes (hairs nearly obscuring surface of segments); male genitalia as in figures 191 and 192; eastern Texas *dubia*
 Base of elytra and legs not both as stated above; male genitalia as in figures 170 and 179 22
22. Elytra with marginal hairs not at all visible from above 23
 Elytra with marginal hairs short but distinctly visible from above 25
23. Front of head transversely tumid; known only from type; "Mexico" . *foveicollis*
 Front of head smooth; Mexico and southern United States 24
24. South central United States; head and elytral costae densely punctured
 *lengii*
 Guerrero, Mexico; head and elytral costae sparsely punctured, the latter with only five or six punctures (three specimens examined) *laevivertex*¹
- 25(22). Base of pronotum transversely depressed, the depression as long as one-third of the length of scutellum and/or with a row of large, rather elongate punctures; United States 26
 Base of pronotum impunctate in some specimens, but without transverse depressions (or with but a weak depression on sides) and without row of large, elongate punctures; United States and Mexico 31
26. Labrum scarcely, if at all, longer than reflexed under side of clypeus; mandibles narrow, not prominent; Nebraska, Kansas, Illinois, Indiana (only 14 specimens examined) *basalis*
 Labrum from one and one-half times to twice longer than reflexed under side of clypeus; mandibles stout, bulbous, prominent (fig. 103) 27
27. Males with hind tibiae thickly fringed on inner side with hairs too numerous to count (fig. 58); females with hind femora widened near middle and sinuate on lower edge (not always quite so strongly as shown in fig. 56); Illinois only *urbana*
 Males with hairs of hind tibiae not exceeding 25 in number; females with hind femora nearly straight, scarcely, if at all, sinuate (figs. 55, 57); Illinois or elsewhere 28
- 28.² Head usually with impunctate area on vertex, front of head with surface usually interrupted at clypeal suture by a slight frown caused by advancement of head over clypeus; punctures of head usually larger and sparser than those of clypeus; not occurring on coastal strip except in Alabama *blanchardi*
 Head punctured on vertex, front usually uniformly smooth and level to front margin of clypeus, without elevations or interruptions at suture; punctures of head and clypeus uniformly dense, often confluent; on coast or inland . 29
29. Sides of pronotum usually scarcely arcuate, nearly straight, scarcely narrowing to front; elytra with punctures of second interval usually either confluent or in only one or two rows; New Jersey west to Illinois, and Alabama . *fulva*
 Sides of pronotum distinctly arcuate and narrowing to front; elytra with punctures of second interval usually separate and distinct and in two or more rows 30
30. Southern Texas only; basal depression of pronotum rather feeble and with round punctures; mentum with declivity situated in apical half, surface of declivity flat *texana* in part
 Northeastern Texas and elsewhere; basal depression of pronotum distinct and long and with elongate punctures; mentum with declivity in apical third, surface uneven or bisinuate . *harperi*
- 31(25). Occurring to the east of Texas or to north or east of southern Kansas 32
 Occurring in Texas and/or northward or westward in the United States, or southward into Mexico 34
32. Front tibiae tridentate, all teeth bunched in apical third of tibiae, apical tooth shorter than inner spur; Atlantic and Gulf coasts and inland
 *frondicola* in part
 Front tibiae either bidentate or third tooth minute and situated at or behind middle, apical tooth almost twice as long as inner spur; Atlantic or Gulf coasts 33
33. Convex, ovate; labrum twice as long as

¹ For this species, see *juquilensis* group.

² In many instances the following species (*blanchardi*, *fulva*, *harperi*, and *texana*) can be distinguished only by the distinctive male genitalia (figs. 185-190).

- reflexed under side of clypeus; antennae 10-segmented; pronotal sides evenly rounded; Atlantic and Gulf coasts *bidentata*¹
- Flat, elongate; labrum scarcely longer than under side of clypeus; antennae nine-segmented; pronotal sides sinuate; southern Georgia and Florida *languida*²
- 34(31). Species characterized as follows: labrum apparently impunctate, about twice as long at middle (not at sides) as under side of clypeus and usually a little advanced from it, surface convex in front, front margin strongly arcuate; scutellum impunctate in 40 of 45 individuals; second interval of elytra more or less unipunctate; propygidium with distinct transverse groove and ridge; 9 mm. or larger; Texas, New Mexico, and Mexico *puncticeps*
- Species not agreeing with all above characters 35
35. Elytral costae with punctures as minute as pinpoints, very shallow (scarcely impressed), and/or very widely and irregularly spaced; surface of elytra often sericeous 36
- Elytral costae with punctures as deeply impressed as other punctures of elytra and as large as at least half of the size of other punctures, usually densely placed; surface of elytra generally shining 38
36. Clypeus in front bi-angulate (angles may be rounded off); front tibiae with all three teeth in front of middle *atramentaria* group³
- Clypeus in front broadly rounded (like a spatula) from side to side, with perhaps a slight emargination at middle; front tibiae with third tooth at middle of tibiae 37
37. Pronotum very transverse (about twice wider than long), its sides strongly subangulate; hind tarsi as long as or longer than hind tibiae; metasternum only one and one-half times longer than second abdominal segment; Jalisco north in western Mexico into western United States *carbonata*
- Pronotum appearing less transverse and with sides evenly arcuate; hind tarsi shorter than hind tibiae; metasternum twice as long as second abdominal segment; southwestern United States *trementina* in part
- 38(35). Elytra with punctures of second interval (fig. 1) placed in a single row (one or two punctures may be out of line); eastern and northeastern Mexico and extreme southern Texas *curvaceps*
- Elytra with punctures of second interval (and other intervals) crowded, and in irregular double or triple rows . . . 39
39. Mandibles in repose stout, convex, and longer than labrum; front of head flat; front margin of clypeus appearing much longer than either side margin; lobes of male genitalia joined on inner edge near middle as in *harperi* (fig. 187); southern Texas only (22 specimens examined) *texana* in part
- Mandibles appearing thin, flat, and usually not so long as labrum; front of head often convex; front margin of clypeus usually no longer than either side margin; lobes of male genitalia joined on inner edge near base 40
40. Front tibiae scarcely widening towards apex, inner edge straight from base to spur; clypeus and head usually divided by space, by slight frown, or by impressed suture; pronotum rather flat, usually one-third of the length of elytra; smaller (6 to 7.5 mm.); male genitalia as in figure 193; eastern states west to Nebraska and Texas, not Mexico *frondicola* in part
- Front tibiae usually distinctly widened towards apex, inner edge curved slightly inward from base to spur; clypeus and head usually presenting uniformly punctured surface; pronotum very convex, usually almost one-half of the length of elytra; larger (7.5 to 9 mm.); male genitalia as in figure 181; Texas and bordering states, including northeastern Mexico *thoracica*

SECTION 1 OF THE SPECIES GROUP *frondicola*

The seven species of this section (*frondicola*, *basalis*, *thoracica*, *curvaceps*, *lengii*, *foveicollis*, and *dubia*) occur from the eastern United States as far west as Nebraska and Texas, some continuing into northern Mexico (one is known only from "Mexico"). All except the last species and *basalis* occur in some part of the state of Texas. These species are quite similar and also rather variable. In gen-

¹ For this species, see *subcostata* group.

² For this species, see *subcostata* group.

³ Some of this group might be confused with *frondicola* group.

eral they have the head and clypeus narrower than the species associated with *harperi* in the following section, and the labrum shorter. The formal descriptions are limited to statements of how each species differs from *frondicola*.

***Diplotaxis frondicola* Say**

Figures 62, 193

Melolontha frondicola SAY, 1825, p. 198 (United States, type locality here restricted to Mississippi; type destroyed). FALL, 1909, pl. 1, figs. 38, 42 (clypeus and claw).

Diplotaxis testacea BURMEISTER, 1855, p. 263 (South Carolina; type, male, in Martin-Luther-Universitat, Zoologisches Institut, Halle).

DIAGNOSIS: Differs from both *basalis* and *thoracica* in the male genitalia (figs. 181, 193), and by having the teeth of the front tibiae in most specimens close together and well in front of the middle, about as in figure 24 of *concura*. The elytra are proportionately shorter than in *basalis*, and the pronotum lacks a distinct basal impression. The pro-

notum is more transverse than that of *thoracica*, shorter, flat, not so convex.

RANGE: Atlantic coast of the eastern United States from Pennsylvania south to northern Florida (Tallahassee) and west on the Gulf to Texas; from Pennsylvania west to Nebraska, Kansas, and Oklahoma. A total of nearly 200 specimens has been examined (see Appendix and fig. 62).

HABITAT: About two dozen specimens from the Agricultural College of Mississippi have the notation "pecan" on the labels; they were taken in April, 1917, and March and April, 1922. Six specimens were taken "on walnut" on May 20, 1936, by Edwin W. Howe, in Clarksville, Tennessee.

DESCRIPTION: Length, 6 to 7.5 mm. Color dark red to tawny. Head finely, densely punctured, descending abruptly to clypeal suture which is distinctly impressed and slightly sinuate at middle, head behind suture in some specimens forming very slight ledge that follows suture. Clypeus more than one-half of the length of head, punctured as on

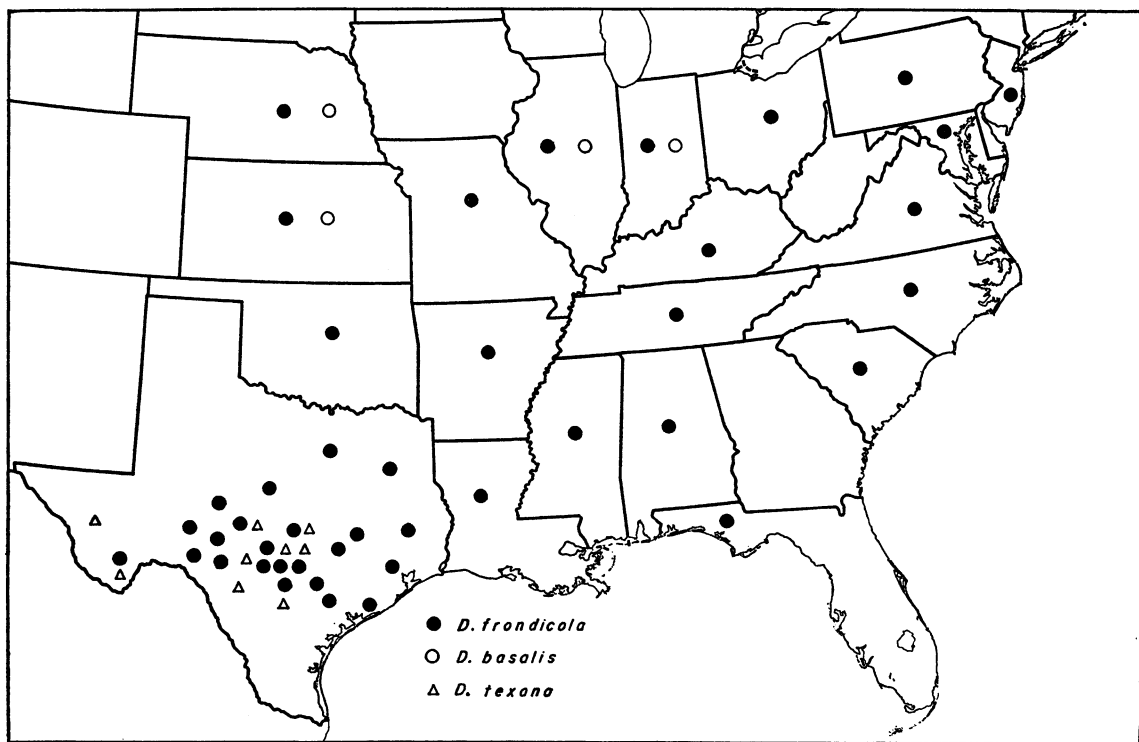


FIG. 62. Distribution of three species of the *frondicola* group of *Diplotaxis*, showing more detail in the state of Texas.

head, anterior third or fourth shallowly reflexed, front margin slightly hemihexagonal in some specimens (as in fig. 39), but angles always rounded and sides not sinuate, front margin in some slightly emarginate. Eyes not small, each eye one-fourth or one-fifth of the width of head. Antennae 10-segmented. Maxillary palpi with last segment not impressed. Mandibles not large. Labrum flat in front, concave behind, level with and slightly longer than reflexed under side of clypeus, finely punctured. Mentum with declivity in apical third posteriorly margined and pubescent.

Pronotum transverse, punctured entirely as on head, sides widest either just behind middle or distinctly behind middle, and gently arcuate to obtuse front and hind angles, base at sides slightly convex and impunctate, appearing vaguely transversely impressed in many specimens. Scutellum not wider than long, densely punctured, or sparsely in a few specimens. Elytra three times longer than pronotum, punctures larger than on pronotum, but equally dense; second interval multipunctate; costae flat, with single row of punctures that are small in some Texas specimens but almost as large as those on striae in others, and in many specimens costae not clearly distinguishable from other intervals because their punctures are so large and fill the costae from side to side; marginal hairs shorter (in some specimens longer) than width of a sutural interval; base within humerus vaguely flattened. Metasternum between coxae twice or nearly twice as long as second abdominal segment. Hind coxal plate truncate on sides but slightly angulate in front. Pygidium uniformly, densely punctured. Propygidium without groove, spiracles not prominent.

Front tibiae with all three teeth in front of middle, the two apical ones very close together in most specimens. Hind femora no wider than length of second abdominal segment and rather straight on lower edge. Middle tarsi with first two segments nearly equal in length, hind tarsi with first segment shorter than second, hind tarsi as long as tibiae. Hind tibiae with setose carinae indistinct, weak, more or less transverse. Claws shorter than one-half of claw segment, bent abruptly at right angles, cleft subapically,

tooth close to and wider than claw. Male genitalia as in figure 193; basal piece about same length as lobes.

SEXUAL DIMORPHISM: Males have the pygidium more transverse and more retracted than females, with the fifth abdominal segment at the middle shorter than the fourth (same length in females). The hind tarsi are longer in males and the hind tibiae less flared apically, and the long spur of the hind tibiae is narrower than in females and not longer than the first hind tarsal segment (slightly longer in females).

REMARKS: This abundant species has a wider geographical range than others of the section but has not been collected in Mexico. It has about the same range as *harperi* of the following section but occurs throughout Texas (except in the northwest) not just in the northeastern corner (as is true of *harperi*). Although *harperi* is a larger species and has a shorter, basally impressed pronotum and larger mandibles, it could be confused with *frondicola*, because some specimens of the latter have a trace of a basal impression. The two species have been taken in May in Leavenworth, Kansas; they have been taken in Washington County, Arkansas, in Orleans, Indiana, and perhaps in other identical localities.

The dorsal punctuation in almost all specimens of *frondicola*, except in some from Texas, is finer and denser than in allied species, and the sides of the pronotum are wider near the base, not the middle. The specimens from Texas that have less dense punctuation (and also the pronotal sides wider near the middle) seem in every other way, including the genitalia of the males, to belong to this species. The lobes of the genitalia in *frondicola* (fig. 193) are so narrow and so delicate that they may appear different in different specimens if not dissected carefully.

The clypeus, said by LeConte (1856, p. 269) to be "always slightly hemihexagonal," resembles that of *carbonata* in shape and in having the front margin scarcely reflexed, whereas the clypeus in most specimens of *thoracica* Fall resembles that of *rufiola* and is strongly reflexed (fig. 39). When both *frondicola* and *thoracica* are available for comparison (true also for *frondicola* and *basalis*), the differences are usually evident, but words to

describe such relative differences may not be very helpful for identification purposes. Even the male genitalia could be misidentified, although the lobes are shorter in *frondicola* than in the other two species mentioned, and do not have the apices widened or strongly turned down. Although *frondicola* and *thoracica* occur in a number of the same counties in Texas (Bexar, Brewster, Comal, Menard, and Val Verde), and both occur sparingly in Oklahoma and Kansas, they are not sympatric elsewhere.

LeConte (*loc. cit.*) placed *testacea* in synonymy with *frondicola*. I have examined Burmeister's type and agree with LeConte. In the Junk catalogue (Dalla Torre, 1912), *testacea* is erroneously listed twice, as a synonym of *frondicola* (p. 46) and as a separate species (p. 49).

Three states have been added to the distribution of the species since my paper on the eastern species (1956, p. 3); they are Tennessee, South Carolina, and Oklahoma.

***Diplotaxis basalis* Fall**

Figures 62, 181

Diplotaxis basalis FALL, 1909, p. 73, pl. 1, fig. 38 (type locality not designated; type, male, is from Barnes, Kansas, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Distinguished from *frondicola* by the much larger and more sparsely punctured pygidium in the male (and in some females) and by the wider hind femora in the female. Differs from both *frondicola* and *thoracica* by having the base of the pronotum distinctly impressed in most specimens, the second interval of the elytra, although punctured irregularly, more nearly unipunctate than multipunctate, the costae convex and shining, and the elytra proportionately longer.

RANGE: Central United States. Specimens have been examined from: *Illinois*: One male, one female. *Indiana*: Orleans, June, one female. *Kansas*: Six. Barnes, one male (the type); Galena, May, two males, one female; Topeka, one male. Some specimens from Nebraska were seen in Fall's collection at the Museum of Comparative Zoölogy. (See fig. 62.)

DESCRIPTION: Length, 8 to 8.5 mm. Color tawny. Agrees with description of *frondicola*

except as follows: clypeus with front margin slightly sinuate at middle and canthi angulate in front of eye; pronotal sides widest at middle and pronotum distinctly transversely impressed along base; elytra with punctures larger, rather confluent, second interval more or less unipunctate, but with scattered double punctures in some specimens, costae convex, with smaller punctures than those of striae and other intervals; pygidium sparsely punctured in majority of specimens, or at least punctures not touching; front tibiae with teeth about equidistant, more deeply cut, third or basal tooth slightly in front of middle. Male genitalia about as in figure 181 of *thoracica*; basal piece of about same length as lobes.

SEXUAL DIMORPHISM: As in *frondicola*, and see diagnosis above.

REMARKS: Fall, who placed this species after *frondicola* and *pinguescens* (= *thoracica*), and before *lengii* and *thoracica*, says (1909, p. 74): "This species looks a little out of place in its present position, and might better be associated with *harperi*, the impression of the basal margin of the prothorax being very similar and nearly as strong as in that species, which, however, differs in its rounded clypeus, wider head, coarser and closer punctuation, somewhat different mentum and more strongly ante-median upper tooth of the front tibia." Actually the clypeus of *harperi* is rather truncate on the front margin, although it gives the impression of being rounded, whereas the clypeus of *basalis* has a slight median emargination in some specimens and appears less rounded, perhaps because the slope of the side margins is less oblique than in *harperi*. The head and clypeus are narrower than those of specimens of *harperi* of the same size. In addition, the labrum is shorter and narrower than that in most *harperi*, and the mandibles in repose are not large and bulbous. The lobes of the male genitalia are quite similar in both species, but the inner edges are joined somewhat closer to the base in *basalis*.

Both *basalis* and *harperi* (although the latter has a much wider geographic range) have been taken in Galena, Kansas, and Orleans, Indiana, on the same date.

Slight variation in some of the characters can readily cause confusion of this species

with *frondicola* which may occasionally have the pronotum vaguely impressed at the base. *Basalis* is the only species of the section that does not occur in Texas; both it and *dubia* are apparently less common than the others.

***Diplotaxis thoracica* Fall**

Figures 181, 182

Diplotaxis thoracica FALL, 1909, p. 75, pl. 1, fig. 43 (Texas; type, male, in the Museum of Comparative Zoölogy).

Diplotaxis pinguescens FALL, 1909, p. 72, pl. 1, figs. 38, 41 (Texas; type, female, in the Museum of Comparative Zoölogy). New synonymy.

DIAGNOSIS: Differs from allied species in the wider, longer, more convex pronotum which is only one-half of the length of the elytra in some specimens. The clypeus resembles that of *lengii* and *curvaceps*, the elytra those of *frondicola*.

RANGE: Southeastern Colorado and southwestern Kansas, south through eastern New Mexico and most of Texas to Chihuahua (one specimen only) in northwestern Mexico and to Nuevo Leon and Tamaulipas in northeastern Mexico. A total of about 230 specimens has been examined (see Appendix), most of them from southern Texas.

HABITAT: A specimen from Kerrville, Texas, was collected on July 22, 1936, "feeding on *Cephalanthus occidentalis*," the button-bush, in the collection of L. J. Bottimer.

DESCRIPTION: Length, 7.5 to 9 mm. Color dark red. Agrees with description of *frondicola* except as follows: clypeal suture obliterated at middle in some specimens; clypeus with front margin more strongly and steeply reflexed in anterior third and in many specimens vaguely emarginate at middle; shape in most specimens as in figure 39 of *rufiola*; labrum in some specimens same length as or shorter than reflexed under side of clypeus; pronotum convex, not appearing transverse, sides widest at about middle, more strongly arcuate, some specimens with longitudinal impunctate area medially; elytra scarcely more than twice longer than pronotum, punctures about twice as large as those of pronotum and denser in most specimens; costae flat, with a row of smaller punctures; marginal hairs slightly longer than width of a sutural interval; base within humerus some-

what depressed in some specimens; front tibiae with position of basal tooth variable, either near middle or distinctly in front of middle, the three teeth either equidistant or the two apical ones close together; claws longer. Male genitalia as in figures 181 and 182; basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *frondicola*, with the additional fact that some males have quite long hairs on the tarsi (not forming pads as in *dubia*, however). Males have narrower hind femora than females.

REMARKS: This species is evidently abundant in southern Texas but becomes scarce farther north and farther south. It has been taken with *curvaceps* at Monterrey, Nuevo Leon, Mexico, and in southeastern Texas. In *thoracica* the second interval of the elytra is crowded with small punctures, whereas in *curvaceps* the punctures are very large and placed in a single regular row. Some individuals are difficult to distinguish from *frondicola*, but the pronotum is not the same. Large individuals resemble *sulcatula*, except for the crowded punctures of the elytra.

The proportions apparently vary quite a bit in this species, and the type of *pinguescens* Fall (Texas) has the pronotum shorter, less convex, and the pronotal sides less arcuate, than the type of *thoracica*. It also has the two apical teeth of the front tibiae closer together (as in *frondicola*), whereas the type of *thoracica* has the three teeth equidistant. The latter (a male specimen) has very long hairs on the tarsi and on the inner edges of the femora and tibiae. Between these two types are many intermediate specimens that vary in the relative length of the pronotum and elytra, and in the combination of front tibiae and tarsal hairs (either kind of tibiae may be associated with either long or short tarsal hairs).

The male genitalia of many individuals of both kinds are alike, and I therefore consider *pinguescens* a synonym of *thoracica*. Although the former has page priority, I keep the latter name as it appears to be better known and more descriptive.

***Diplotaxis curvaceps* Fall**

Figure 193

Diplotaxis curvaceps FALL, 1909, p. 77, pl. 1, figs. 44, 45 (Brownsville, Texas; type, male, from

Esperanza Ranch, Brownsville, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Very similar to *thoracica* in most characters, but differs from it and from *frondicola*, *basalis*, and *dubia* by having larger, coarser punctures on the pronotum and only a single row of large punctures on the second elytral interval (at least at the base), not three or more rows (some specimens from Mexico do have double rows; see below). The color is usually black, the surface is very polished, and the punctures of the pygidium are quite sparse.

RANGE: Eastern Mexico from the states of Guanajuato and Hidalgo north to extreme southeastern Texas (Cameron and Hidalgo counties). A total of 250 specimens from 13 localities has been examined (see Appendix).

DESCRIPTION: Length, 6.5 to 8 mm. Color black; some are dark red. Agrees with description of *frondicola* except as follows: head with larger punctures; clypeus with front margin more reflexed and more evenly rounded in arc of a circle, but hemihexagonal in a few specimens; mentum with declivity longer, in some specimens starting near middle of mentum; pronotum convex, not appearing strongly transverse, twice as long as head and clypeus combined, punctures larger than those of *frondicola*, sides more arcuate, hind angles rounded off; elytra less than three times longer than pronotum, punctures twice as large as and sparser than those of pronotum, second interval with single row of punctures as large as those of striae, in a few specimens punctures in double row near apex, costae with sparser, smaller punctures; pygidium with large punctures that are rather sparse in most specimens; hind femora slightly sinuate on lower edge; claws slightly longer, tooth not so wide. Male genitalia as in figure 193 of *frondicola*, but somewhat stouter, and basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *frondicola*, with the additional fact that the hind femora of the females are more sinuate than those of the males and rather wider, in some specimens wider than the second abdominal segment is long.

REMARKS: Although described from the United States, this species appears to be more common in northeastern Mexico than in

Texas, where it occurs in the extreme south only.

The species of section 4 (*pacata*, *subangulata*, *rufiola*, and *carbonata*), although they have the second elytral interval more or less unipunctate as in *curvaticeps*, differ by having the pronotum proportionately much shorter and the pronotal sides subangulate. They are western species that enter Texas in the western part only. This species differs notably from *thoracica*, which occurs in the same localities in southeastern Texas, in the punctuation, as stated in the diagnosis, but the general shape of the clypeus and pronotum is somewhat the same in the two species, and they might be confused at first glance. Thus I have seen a female of each species from Bentsen State Park in Mission, Texas, and the *curvaticeps* individual has a few additional punctures in the second elytral interval at the middle, which makes it resemble *thoracica*. A female specimen from Pachuca in Hidalgo, Mexico, and specimens from Monterrey might also be mistaken for *thoracica* because of the irregular punctures of the second elytral interval. The punctures, however, are usually in a single row at the base in *curvaticeps*. The male genitalia differ slightly, the lobes being shorter and stouter in *curvaticeps* (figs. 181, 193).

Diplotaxis lengii Fall

Figures 179, 180

Diplotaxis lengii FALL, 1909, p. 74, pl. 1, fig. 43 (Vowel's [Vowells] Mill. Louisiana; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: This species differs from others of the section and group by having the pronotum without trace of a basal transverse depression, but with the area in front of the scutellum shallowly sunken, the pronotal punctuation distinctly sparse, and the marginal hairs of the elytra so short that they are not visible from above. The punctures of the pygidium are large, sparse, and shallow; the second elytral interval is multipunctate, and the scutellum appears narrower than normal.

RANGE: South central United States from Louisiana and eastern Texas north to Arkansas and southeastern Kansas. A total of 49 specimens has been examined (see Appendix).

DESCRIPTION: Length, 7.5 to 10 mm. Color

black to dark red, with aeneous or greenish sheen in certain light. Agrees with description of *frondicola*, except as follows: head in most specimens with sparse punctures or impunctate area at top, and punctures of head and clypeus actually not so dense as in *frondicola*; clypeal suture obliterated at middle; clypeus with anterior third reflexed, shape about as in figure 39 of *rufiola*; labrum no longer than reflexed under side of clypeus; pronotum flat, with punctures of disc irregularly spaced and much sparser than those on head, sides widest at middle and scarcely arcuate, depression present within hind angles in some specimens, base not convex or transversely depressed, but shallowly depressed in front of scutellum; elytral punctures denser than those on pronotum, some punctures confluent, punctures of costae much smaller than those of intervals and striae, marginal hairs not visible from above, because shorter than width of epipleurae; pygidium with very large, shallow, sparse punctures; propygidium with faint groove in some specimens; front tibiae with third or basal tooth median in most specimens, all teeth well separated: middle tarsi with first segment slightly longer than second; hind tibiae with setose carinae distinct in most specimens. Male genitalia as in figures 179 and 180; basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *frondicola*, but the differences are not very marked in many individuals. The best indicators of sex in this species are the longer hind tarsi of the males, the abruptly flared apices of the hind tibiae in the females (no flare in males), the narrower hind femora of males (less than the length of second abdominal segment), and the longer, narrower first segment of the hind tarsi in males (in females this segment is almost twice wider at apex than the apex of the second segment).

REMARKS: Fall thought the "aeneous surface lustre," the "piceous or blackish color," the "subobsolete mental ridge," and the median tooth of the front tibiae sufficient to separate this species. Some of these characters are not peculiar to this species, and some show individual variation (front tibiae and mentum), but, taken with those characters given in the diagnosis above, they define the species quite well.

The clypeus and head and even the male genitalia (figs. 179, 180) are very similar to those of *blanchardi*, but that species, among other differences, has the base of the pronotum transversely depressed and a very long labrum. *Diplotaxis lengii* is larger on the whole than the other species of the section except for some specimens of *thoracica*, a species occurring in part of the same geographical area and which differs from *lengii* principally in its larger, very convex, and densely punctured pronotum and proportionately shorter elytra. A smaller species with similar head is *curvaticeps* which differs by having a single row of punctures on the second elytral interval.

Of the 40 or more specimens examined, none has the marginal hairs of the elytra showing from above; a few sparse hairs are actually present, but they are shorter than the width of the epipleurae.

Diplotaxis foveicollis Moser

Diplotaxis foveicollis MOSER, 1918, p. 315 (Mexico; type, male, in the Zoologisches Museum, Berlin).

DIAGNOSIS: Differs from others of the group except *lengii* in the absence of hairs on the reflexed margins of the elytra, and from *lengii* in the tumidity and impressions on the head and the different placement of the teeth of the front tibiae. Differs further from the other species by having minute punctures on the elytral costae.

RANGE: Probably northern Mexico but known only from the type. The type was received by Moser from Staudinger and Bang-Haas, and the other species described from this same source by Moser in his 1918 paper are from northern Mexico or the United States (*rufocastanea*, *sericeiventris*, *impressicollis*, *puncticeps*, *labrata*, and *fusca*).

DESCRIPTION OF MOSER'S TYPE: Length, 7.5 mm. Color red, head black. Agrees with description of *frondicola*, except as follows: head between eyes with two shallow, round impressions, front of head declivous and transversely slightly tumid behind clypeus; clypeus with front margin not reflexed, shape as in figure 39 of *rufiola*, eyes nearly one-quarter of width of head; pronotum sparsely punctured on sides and on disc, some punctures separated by twice their diameter, sides

slightly sinuate in front of hind angles, front of pronotum with shallow transverse impressions laterally; elytra slightly more than three times longer than pronotum; costae convex, with a single row of minute punctures; marginal hairs not at all visible; metasternum two and one-half times longer than second abdominal segment; pygidium sparsely, irregularly punctured; propygidium with slight trace of groove; front tibiae as in those specimens of *frondicola* that have the two apical teeth very close together; hind femora narrower than length of second abdominal segment. Male genitalia (on point mount) with lobes destroyed.

SEXUAL DIMORPHISM: No female available for comparison.

REMARKS: Moser placed the description of this species between that of *fossifrons* and that of *aereomicans* (both from southeastern Mexico), rather different species, but he made no comparisons with any other species. With only one specimen available, it is impossible to say whether certain traits, such as the impressions on the head and pronotum, are characteristic or not. The elytra near the base have also an impression, but this seems distinctly to have been caused by some accident. The only other species of the group with the pronotum impressed behind the front angles is *pacata*, a much shorter, stouter, darker species, with very long marginal hairs and large pronotum.

The type specimen has long, narrow hind femora and tibiae, and the teeth of the front tibiae bunched together, as in *fulva*, *blanchardi*, and *urbana* (all from the United States), but the smaller, narrower, sparsely punctured pronotum of *foveicollis* is not similar, and the mandibles are not large and stout as in the other species mentioned.

***Diplotaxis dubia* LeConte**

Figures 191, 192

Diplotaxis dubia LECONTE, 1856, p. 269 (Texas, here restricted to eastern Texas; syntypes, female, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, figs. 38, 44 (clypeus and claw).

DIAGNOSIS: This species is distinguished from others of the section by having long, quite thick, and abundant hairs on the soles of the tarsi and on the lower edges of the femora (more marked in males), the area within

the humerus of the elytra with a deeper round depression (not merely flattened), and the lobes of the male genitalia much more stout and joined on the inner side farther from the base (figs. 191, 192).

RANGE: Eastern Texas. Forty-two specimens have been examined: Bryan, Brazos County, three males, six females; Smith County, April, eight males; Colorado County, April, one male, one female; Fedor, Lee County, one male; Cherokee County, April, one female; Walker County, May, one female; College Station, Brazos County, 15 males, three females; Myrtle Springs, Van Zandt County, two females.

DESCRIPTION: Length, 6 to 7 mm. Color light brown to tawny. Agrees with description of *frondicola*, except as follows: head not quite so densely punctured; clypeal suture straight in some specimens; clypeus with front margin rounded from side to side as in arc of a circle; pronotum with sides widest at about middle, more strongly arcuate, and slightly sinuate to front and rear; base of elytra within humerus distinctly depressed in most specimens; front tibiae with three teeth about equidistant, basal tooth only slightly in front of middle and small or nearly obsolete; claws slightly longer. Male genitalia as in figures 191 and 192; basal piece distinctly longer than lobes.

SEXUAL DIMORPHISM: As in *frondicola*, with the additional fact that all tarsi are distinctly longer in males (the middle tarsi are at least twice as long as the middle tibiae), the segments larger and more hairy, the very long abundant hairs almost forming tarsal pads. Males have the setose carinae of the hind tibiae less marked than do females.

REMARKS: Although dorsally almost a replica (except for the impressed humeral area) of *frondicola*, this species differs distinctly in the male genitalia and tarsal hairs as mentioned above. It differs further by having the teeth of the front tibiae longer, and more deeply cut, the third tooth being either at the middle or virtually obsolete. As stated by Fall (1909, p. 77), "the development of the tibial teeth is often somewhat variable," and, although Fall's and LeConte's specimens of *dubia* had the basal tooth subobsolete, a number of the specimens examined by me have it distinct.

The clypeus differs from that of most specimens of *frondicola* by being more truly "rounded in an arc of a circle" (LeConte, 1856, p. 269), more as in *curvaticeps* (Texas and Mexico), not emarginate at middle as in many individuals of *frondicola*. Differs further from *curvaticeps* by having the elytral punctures crowded and dense, not in sparse, regular rows.

The tarsal hairs in fresh specimens are sufficiently thick to hide the surface of the segments; in profile view they form a golden fringe, the hairs and the segments combined being as broad as the tibiae. Males of *fulva* (labrum very long) from farther north and east have the tarsi fringed also but less abundantly.

SECTION 2 OF THE SPECIES GROUP *frondicola*

In this section are placed seven species (*harperi*, *texana*, *fulva*, *blanchardi*, *urbana*, *punctatorugosa*, and *brevisetosa*) from the eastern and central states (not farther west than Oklahoma), including parts of Texas, but not Mexico. They are characterized, in addition to the rotund clypeus, by having a long, large labrum and, with the exception of *brevisetosa*, large, rather bulbous mandibles and the surface of the declivity of the mentum uneven or tumid (but rather flat in most specimens of *texana*). The base of the pronotum is transversely depressed in some of the species (depression obsolete in some individuals of *texana* and *urbana*, present at the sides only in *punctatorugosa*, and lacking in *brevisetosa*). Males of three of the species (*harperi*, *fulva*, and *blanchardi*) have exceptionally long and narrow hind legs. The only dorsally hairy species is *brevisetosa* which probably could be placed by itself, as it is rather different from the others. The first five species are so similar that only the differences are noted in the formal descriptions; the last two species are compared with *harperi*.

Diplotaxis harperi Blanchard

Figures 63, 187, 188

Diplotaxis [sic] *harperi* BLANCHARD, 1850, p. 171 (Savannah, Georgia; type not found in the Muséum National d'Histoire Naturelle, Paris). FALL, 1909, pl. 1, figs. 44, 49 (clypeus, claw). VAURIE, 1956, fig. 5 (genitalia).

DIAGNOSIS: Distinguishable from the closely allied species with the base of the pronotum transversely depressed, except *texana*, by having the inner edges of the lobes of the male genitalia joined at basal third instead of basal fourth, the antennal club of the male proportionately shorter, the pygidium generally smaller and more densely punctured, and the males with less hairy tarsi. (See also diagnoses of *texana* and *fulva*.)

RANGE: Atlantic Coast from Massachusetts south to northern Florida, Alabama, and northeastern Texas; in the north, from New Jersey west to Minnesota, Iowa, eastern Kansas, and eastern Oklahoma. About 500 specimens have been examined (see Appendix, also fig. 63).

HABITAT: The data that follow appear on labels of specimens: "taken from oak," in Anna, Illinois, May, 1909, by L. M. Smith; "on oak at night," "on hickory," and "in oaks," in Carbondale, Illinois, May, 1910, by Smith and Cord; "at base of oak," in Lawrence, Kansas, March 24, 1935, by M. W. Sanderson; "on Red Bud," in Clarksville, Tennessee, June 21, 1936, by W. Howe; "ex forest debris," in Cave-in-Rock, Illinois, May, 1956, by L. J. Stannard.

DESCRIPTION: Length, 7 to 8.5 mm. Color light brown to dark red, mandibles black, head black in a few specimens. Head and clypeus uniformly finely and densely punctured, confluent in some specimens, clypeal suture visibly impressed and sinuate at middle in most specimens. Clypeus more than one-half of the length of head, front margin reflexed only by its own width, and either rounded from side to side in an arc of a circle, or rather truncate in front; sides not sinuate, but canthi strongly angulate in most specimens. Eyes moderate, each eye from one-fourth to one-fifth of the width of head. Antennae 10-segmented. Mandibles large, stout. Maxillary palpi with last segment not impressed basally. Labrum flat, markedly densely punctured, level with and from one and one-half times to twice longer than reflexed under side of clypeus. Mentum with anterior declivity in apical third having posterior edge margined, pubescent, and nearly straight, surface of declivity uneven, more or less bisinuate.

Pronotum distinctly transverse, punctures

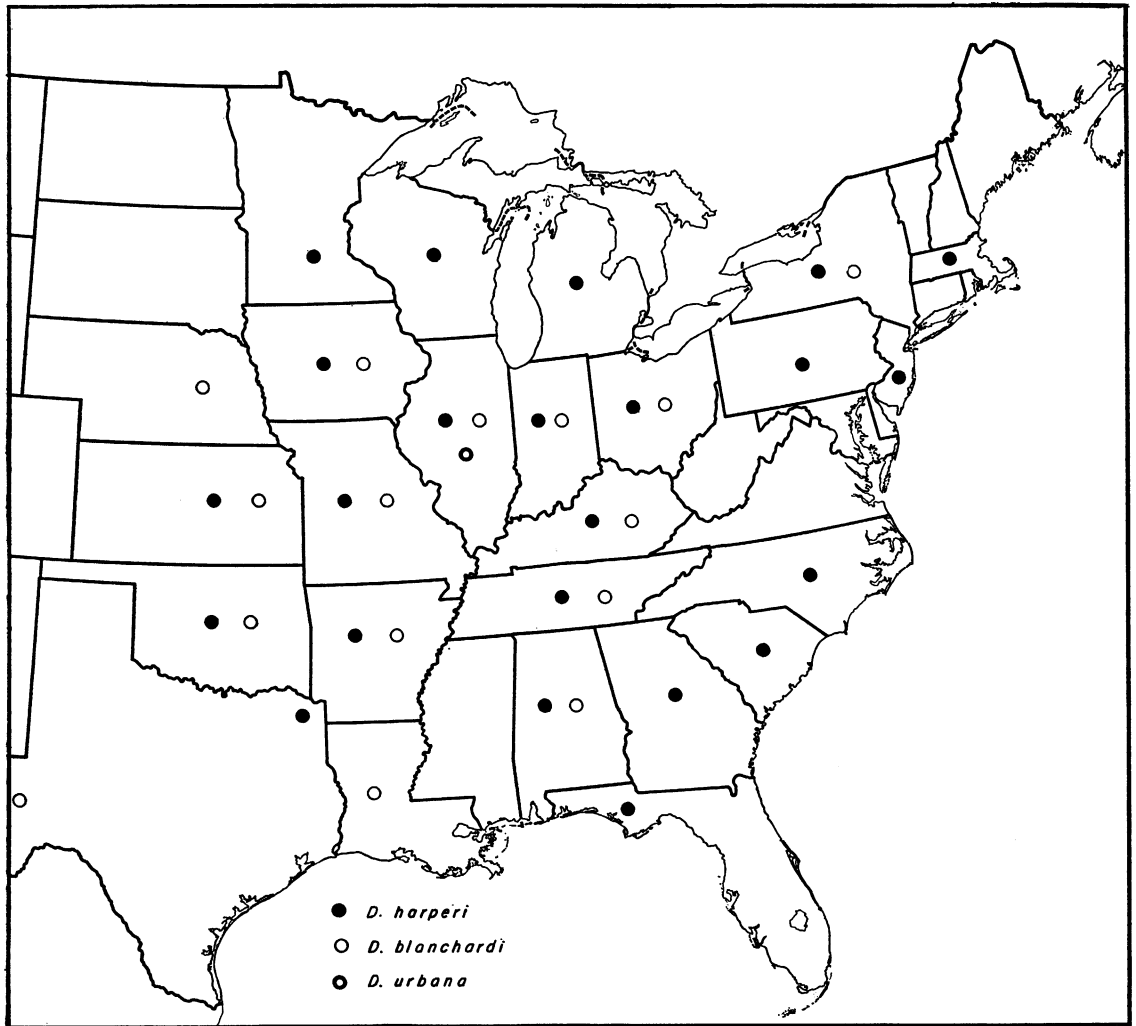


FIG. 63. Distribution of three species of the *frondicola* group of *Diplotaxis*, showing exact localities in Texas and Florida only.

of disc in most specimens slightly sparser than those of head, dense on sides, sides widest slightly behind middle, gently arcuate to obtuse front and hind angles, base distinctly transversely depressed, the depression as long as one-third of the length of scutellum and filled with a line of elongate punctures; some specimens with impunctate, sometimes elevated, space medially. Scutellum not wider than long, sparsely or densely punctured. Elytra at least three times longer than pronotum, punctures slightly larger than those of pronotum, dense, some punctures confluent; second interval multipunctate; costae

somewhat convex, their punctures, in single row, almost as wide as the costae; marginal hairs sparse, shorter than width of a sutural interval; base within humerus vaguely flattened. Metasternum between coxae twice as long as second abdominal segment. Hind coxal plate truncate laterally, but slightly angulate in front in some specimens. Pygidium densely punctured. Propygidium not grooved, spiracles not prominent.

Front tibiae with all three teeth distinctly in front of middle, the two apical teeth very close together, basal tooth virtually obsolete in some specimens. Hind femora not wider

than second abdominal segment is long. Middle tarsi with first two segments about equal in length, hind tarsi with first segment shorter than second, hind tarsi as long as tibiae. Hind tibiae with setose carinae indistinct, weak, more or less transverse. Claws bent abruptly at right angles, cleft subapically, tooth as long as and twice wider than claw. Male genitalia as in figures 187 and 188; basal piece approximately of same length as lobes.

SEXUAL DIMORPHISM: The shape of the pygidium and the relative lengths of the fifth abdominal segment and of the spurs and tarsi to the hind tibiae are not very constant. The sexes in this species can be distinguished by the hind femora which in males are definitely narrower than the second abdominal segment is long, but fully as wide in females, and by the fact that the first segment of the hind tarsi is more abruptly widened apically and is proportionately shorter in females.

REMARKS: This species is as widespread and as abundant as *frondicola*; it occurs in many of the same localities and also on deciduous trees. The majority of specimens of *harperi* are from the central states of Illinois, Missouri, Arkansas, and Kansas; only three or four have been seen from the northeast; only two from Florida (Tallahassee); only a few from Georgia (type locality is Savannah). Generally it is readily separable from *frondicola* by its distinct basal impression on the pronotum, its larger size, and its much broader head and clypeus, but a few large specimens of *frondicola* with a trace of pronotal impression might be confused; *frondicola*, however, never has elongate punctures in the basal impression.

Many individuals of *harperi* are not separable externally from *fulva*, because the curve of the sides of the pronotum and the punctuation of the second elytral interval and of the costae are variable in both species. Males from various counties in Ohio had to be dissected before identification could be made certain. Although males of *harperi* do not have such long hairs on the tarsal soles as *fulva*, the length is relative and not always striking. These two species and also the similar *blanchardi* (males dissected) have been collected at the same time and place in Alabama (Monte Sano, Madison County, June,

1938, by A. F. Archer), and occur together also in New York, Ohio, and Illinois (see also *basalis* and *blanchardi* for comparisons). In males of *harperi* and *fulva* the hind femora are so narrow that they seem scarcely wider than the hind tibiae.

Diploaxis texana LeConte

Figures 62, 187

Diploaxis texana LECONTE, 1856, p. 268 (New Braunfels, Texas; two syntypes, females, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 44 (clypeus).

DIAGNOSIS: The head, clypeus, and male genitalia are almost the same as those of *harperi*, but the size is usually larger, the labrum and mentum differ slightly, the pronotum is proportionately longer, and the punctuation is less coarse. The pronotum differs further from that of *harperi*, as well as from that of *fulva*, *blanchardi*, and *urbana*, by having the basal transverse depression indistinct or absent; when present (on the sides only) the depression lacks the elongated basal punctures of the other species.

RANGE: Apparently restricted to the southern half of Texas (fig. 62). Only 21 specimens have been examined (see Appendix).

HABITAT: A specimen from Kerrville, Texas, taken July 22, 1956, was found "feeding on *Cephalanthus occidentalis*," a shrub or small tree of the family Rubiaceae, called button-bush in the United States. L. J. Bottimer was the collector.

DESCRIPTION: Length, 7.5 to 9.5 mm. Color as in *harperi*. Agrees with description of *harperi*, except as follows: clypeal suture straight in most specimens, sinuate in only a few; clypeus with front margin perhaps slightly more reflexed; each eye one-fifth of width of head; labrum rather evenly concave from side to side; mentum with anterior declivity in apical half, the posterior margin arcuate and strongly margined, surface of declivity flat in most specimens; pronotum not depressed at center base and only weakly, if at all, transversely depressed on sides, depression with series of round punctures in some specimens; elytra with marginal hairs in some specimens slightly longer than width of a sutural interval. Male genitalia about as in figure 187 of *harperi*.

SEXUAL DIMORPHISM: As in *harperi*, with

the additional fact that the spurs of the hind tibiae are very wide in females, as wide, in some, as the base of the first segment of the hind tarsi.

REMARKS: This species is apparently restricted to southern Texas and is not at all common. It could readily be mistaken for the widespread *harperi*, but of the hundreds of specimens of *harperi* examined only one has been seen from Texas and that one is from the northeastern corner of the state. The characters given in the diagnosis are constant in all the specimens, except for an individual from Fort Davis and two individuals from Alpine which have the mentum short and its posterior edge rather straight as in *harperi*. The lobes of the genitalia of the male are narrow apically, not widened into a small bulb as in most specimens of *harperi* (fig. 187), but some specimens of *harperi* also have the lobes narrow at the apex.

A common Texan species that also resembles *texana* is *thoracica* Fall which occurs in neighboring states as well as in Texas. Fall (1909, p. 81) says that LeConte's second specimen of *texana* is in fact *thoracica*. Both species have similar elytra, but the clypeus is broader and more amply rotund in *texana* than in *thoracica* and has the front margin scarcely reflexed; the eyes are more widely spaced, the pronotum is proportionately shorter and more transverse, and the mandibles are large and bulbous, not small and narrow. The lobes of the genitalia of the male are joined on their inner margins farther from the base in *texana*. Most individuals of *thoracica* have no basal depression on the pronotum.

***Diplotaxis fulva* LeConte**

Figures 64, 189, 190

Alobus fulvus LECONTE, 1856, p. 273 (New York; type, male, in the Museum of Comparative Zoölogy). VAURIE, 1956, fig. 4 (genitalia).

DIAGNOSIS: Scarcely distinguishable externally from *harperi*, *urbana*, and *blanchardi*, except that the sides of the pronotum are usually almost straight and parallel, not so arcuate as in the other species, and they are scarcely narrowed in front, but stand out laterally from the eyes (some individuals of *harperi* have this kind of pronotum also). The

male genitalia, however, are diagnostic (figs. 189, 190), and males have longer tarsal hairs. In general the elytral costae nearer the suture have sparser punctures in *fulva*, with large areas impunctate.

RANGE: New York, New Jersey, and Maryland, west to Ohio and Illinois in the eastern United States, and Alabama in the south. A total of 48 specimens has been examined (see Appendix; also fig. 64).

DESCRIPTION: Length, 8 to 8.5 mm. Color as in *harperi*. Agrees with description given for *harperi* except as follows: pronotum with sides in some specimens scarcely arcuate, basal depression in some specimens obsolete at middle; elytra with punctures of second interval appearing more as if they formed a single irregular row than a double row. Male genitalia as in figures 189 and 190; basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: As given for *harperi*, with the additional fact that the tarsi of males have long golden hairs; the hairs are not so dense as to hide the surface but are long.

REMARKS: LeConte made a separate genus (*Alobus*) for this species, because he thought that there was no apical membrane on the pronotum (one of the original characters of *Diplotaxis*) and that the last segment of the maxillary palpi was more elongate than usual. The membrane is not always visible on all specimens of *Diplotaxis*, however, and the palpal segment is elongate in *harperi* also, and in other species. As stated in a previous paper (Vaurie, 1956, p. 4), I follow Fall (1909, p. 80) in considering *fulva* a typical *Diplotaxis*, although Fall thought *fulva* was only a variety of *harperi*. His observation that it is strange that no second specimen should have been found in 50 years of collecting is explained by the fact that specimens of *fulva* in collections have always been hidden among those of *harperi*. The two species are separable when males are available by the more hairy tarsal fringe of *fulva* as well as by the diagnostic genitalia. Males of *blanchardi* and *urbana* also have a strong fringe of hairs on the tarsi, but these two species differ by having the punctation on the head sparse; they are usually larger, have distinctly arcuate sides of the pronotum, and different male genitalia. The apices of the male genitalia of *fulva* are

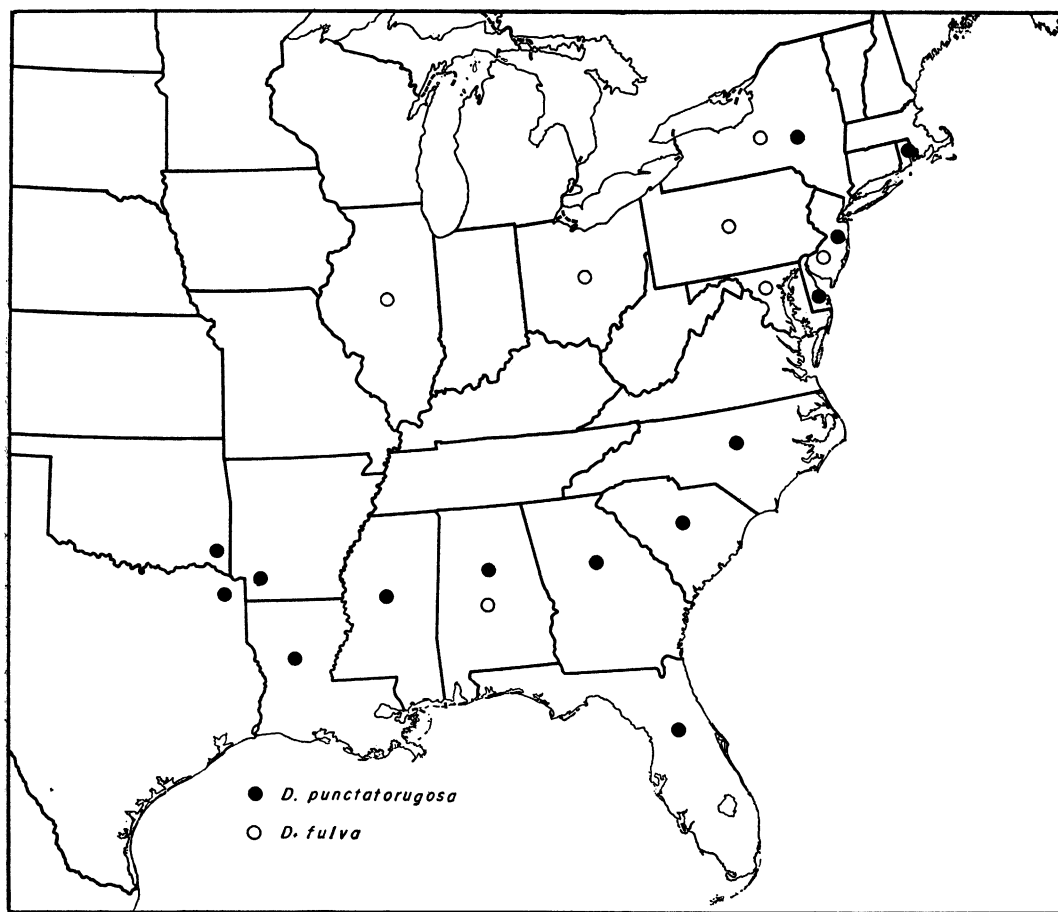


FIG. 64. Distribution of two species of the *frondicola* group of *Diplotaxis*.

strongly turned down, not slightly deflexed as in *harperi*, nor straight as in *urbana* and *blanchardi*; the inner margins of the lobes are joined at the basal fourth or fifth as in *blanchardi*, not at the basal third as in *harperi*, these margins being sinuate and widely separated at the middle, not straight and nearly parallel as in *blanchardi*. The basal piece is slightly longer than the lobes, not shorter as in *blanchardi* (see figs. 183–190).

Specimens of *fulva* show a tendency to have the second interval of the elytra less crowded with punctures than do the other species discussed above. Many individuals do not have the sides of the pronotum as straight as in the type. This species has a smaller geographic range than *harperi* or *blanchardi* and is the only one in this section that does not occur in Texas.

***Diplotaxis blanchardi* Vaurie**

Figures 55, 57, 63, 185, 186

Diplotaxis blanchardi VAURIE, 1956, p. 4, figs. 6, 7 (Elmwood, Tennessee; type, male, in the American Museum of Natural History).

DIAGNOSIS: Distinguished in general from *harperi* and *texana* by having larger eyes, the head with a post-clypeal ledge and an impunctate spot on the vertex, the punctuation not so dense and uniform, and the clypeus longer and not angulate in front of the eyes. Distinguished from *fulva* by the distinctly arcuate sides of the pronotum. (See also diagnosis of *urbana*.)

RANGE: From New York southwest (not on the coast) to Alabama and western Texas and west to Iowa and western Nebraska. A total of 150 specimens has been examined (see Appendix; also fig. 63).

HABITAT: Specimens have been collected "on oaks" at Carbondale, Illinois, May 19, 1910, by Smith and Cord, and "on walnut" at Lawrence, Kansas, April 29, 1934, by M. W. Sanderson.

DESCRIPTION: Length, 8.5 to 10 mm. Color as in *harperi*, head black in many specimens. Agrees with the description of *harperi*, except as follows: head with punctures irregularly placed and larger and sparser than those on clypeus, an impunctate spot present in many specimens on top of head, a slight ledge or frown behind clypeal suture present in some specimens; clypeus with front reflexed by more than width of margin; canthi not prominent; each eye about one-fourth of width of head in most specimens; labrum at least twice as long as under side of clypeus; pronotum with punctures of disc in some specimens of same density as those on head, basal depression in some specimens obsolete at middle. Male genitalia as in figures 185 and 186; basal piece slightly shorter than lobes.

SEXUAL DIMORPHISM: As in *harperi*, but the tarsi of males are more hairy.

REMARKS: The characters given in the diagnosis may vary a little for both *harperi* and *blanchardi*, so that some individuals are difficult to identify externally. The male genitalia, however, are diagnostic, those of the former (figs. 187, 188) having the lobes joined on their inner side at the basal third and the apices more turned down, those of *blanchardi* (figs. 185, 186) having them joined at the basal fourth, and the apices nearly flat. The male genitalia (except for the apices of the lobes, see fig. 184) are very similar to those of *urbana*, a species that resembles *blanchardi* in almost all other characters (see *urbana*). In part 1 of this revision, *blanchardi* was confused with *urbana* to the extent that I stated (1958, pp. 278-279) that some males of *blanchardi* had the hind tibiae fringed with long hairs on the inner side; these males are males of *urbana*.

Of those two very similar species, *blanchardi* is far less common than *harperi* and more common than *urbana*. It has not been found to occur with *urbana*, but occurs around it in the same state (Illinois). It has been taken in many of the same localities as *harperi*, however (in Alabama, Kentucky, Missouri, Iowa, Illinois, and Indiana), but not along the At-

lantic seaboard, where *harperi* is found, except possibly for one female specimen labeled "New York." Both *blanchardi* and *harperi* have been collected from oaks, but no specific ecological data are available for *urbana*.

Another species (*fulva*) occurs in some of the same localities as *blanchardi* (in Alabama, Illinois, and Ohio). These species, although distinctly separable by the difference in the male genitalia, and usually by the sides of the pronotum (arcuate in *blanchardi*, nearly straight in *fulva*), or by the elytral punctuation (much more crowded in *blanchardi*), cannot always be identified without dissection of the males.

***Diplotaxis urbana* Vaurie, new species**

Figures 56, 58, 63, 183, 184

TYPE MATERIAL: Type, male, "Urb." [Urbana], Illinois, May 31, 1927, "light," in the American Museum of Natural History. Twenty-four paratypes (11 males, 13 females) at various dates from May to July in 1928, 1929, 1932, 1933, and one in September, 1890, from Urbana, many of them taken at light, in the American Museum of Natural History and the Illinois Natural History Survey, Urbana.

DIAGNOSIS: Distinguished from *blanchardi* by only a few characters: the truncate male genitalia (fig. 183), the thickly fringed hind tibiae of the male (fig. 58), the somewhat longer marginal hairs of the elytra, the somewhat less distinct basal depression of the pronotum, and the sinuate lower edge on the hind femora of the female (fig. 56). The secondary sexual characters separate this species also from others of the group.

RANGE: Mostly central Illinois, but four females have been seen from Anna and Grand Tower in southern Illinois. Other specimens examined, but not included in the paratype series, are: Champaign, two females; Oakwood, one male; Urbana, eight males, five females (fig. 63). These Urbana specimens were collected between 1886 and 1892, some from earth in the forest, some from a farm, some at a lantern at night, some from stumps in overflown land.

DESCRIPTION OF TYPE, MALE: Length, 9.5 mm. Color dark red, head and tips of mandibles black. Agrees with description of *harperi*,

except as follows: head with punctures irregular and sparsely placed, and sparser than those of clypeus, a slight ledge or frown present behind clypeus; clypeal suture not visibly impressed; clypeus with front reflexed by more than width of margin and more or less rounded from side to side; canthi not prominent; each eye one-fourth of the width of head; labrum twice as long as reflexed under side of clypeus; pronotum with punctures of disc of same size and density as those of head, punctures on sides confluent, no impunctate median space present; scutellum with two punctures; elytra with marginal hairs slightly longer than width of a sutural interval; hind coxal plate not angulate laterally; front tibiae with basal tooth virtually obsolete, represented by slight angulation. Male genitalia as in figures 183 and 184; basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *harperi*, except that the type and other males have the apical half of the hind tibiae fringed with long, thick, golden hairs on the inner side, and the tarsi somewhat more hairy. The females have the hind femora strongly sinuate at the middle (fig. 56) and shorter tarsi than males. The middle tarsi of the type are exactly twice as long as the middle tibiae.

VARIATIONS FROM TYPE: The length ranges from 8.5 to 10.5 mm. Some of the paratypes differ from the type by having the clypeal suture impressed, the eyes slightly smaller, the disc of the pronotum impunctate and slightly elevated medially, the basal impression of the pronotum less well marked, the scutellum with as many as 15 or 20 punctures, the punctures of the elytral costae smaller in size, the hind coxal plate slightly angulate at the front of the sides, the pygidium rather sparse, and the eyes less widely separated.

REMARKS: Six specimens of this species were mentioned at the time of the description of *blanchardi* (Vaurie, 1956, p. 6). Additional specimens from the vicinity of Urbana and four from the southern part of the state agree with the original group of six in respect to the genitalia and legs, the females as well as the males being found to differ slightly from individuals of *blanchardi*. The hairs on the inner hind tibiae of the males are so abundant in *urbana* that they cannot be counted individually, whereas in *blanchardi* there are no more

than 20 hairs, usually fewer.¹ The sinuate, almost bulbous, hind femora characteristic of females of *urbana* are also present, though to a much lesser degree, in some females of *blanchardi*. The marginal hairs of the elytra in both sexes are longer than the hairs of *blanchardi*; even 60- and 70-year-old specimens of *urbana* (some collected from 1890 to 1892, in the collection of the Illinois Natural History Survey in Urbana) have longer hairs.

The difference in the male genitalia of these two species is not always so marked as shown in the figures, but the apices of the lobes in *urbana* are uncompromisingly truncate and not at all turned down, while those of *blanchardi* are slightly rounded to the sharp inner angle which is just perceptibly turned down. Another difference is that the lobes in *urbana* (a larger beetle) are proportionately shorter than those in *blanchardi*.

I have not seen any specimens of *blanchardi* from Urbana itself, or from the other localities where *urbana* occurs (Champaign, Oakwood, Anna, and Grand Tower), but they may yet be found together. Another extremely similar species (*harperi*), with even more different male genitalia, has been taken at both Urbana and Anna.

Diplotaxis punctatorugosa Blanchard

Figures 64, 194

Diplotaxis [sic] *punctatorugosa* BLANCHARD, 1850, p. 171 (Savannah, Georgia; type not found in the Muséum National d'Histoire Naturelle, Paris).

Diplotaxis [sic] *frondicola* "Say" BLANCHARD, 1850, p. 171 ("Amer. bor."), not *D. frondicola* Say, 1825, name cited in error. According to LeConte, 1873, p. 329, this form is a variety of *excavata* [= *punctatorugosa*].

Diplotaxis excavata LECONTE, 1856, p. 267 (Georgia; type, female, in the Museum of Comparative Zoölogy). FALL, 1909, fig. 22 (clypeus and claw).

Diplotaxis frontalis LECONTE, 1856, p. 268 (Georgia; type, male, in the Museum of Comparative Zoölogy). FALL, 1909, fig. 22 (clypeus and claw).

Diplotaxis densicollis FALL, 1909, p. 52, pl. 1, fig. 22 (South Carolina; type, male, in the Museum of Comparative Zoölogy).

¹ *Urbana* should replace *blanchardi* in part 1 (Vaurie, 1958, pp. 278-279) as an example of a species in which the male has hairy inner edges on the hind tibiae.

DIAGNOSIS: Differs from the five preceding species of the section by having the head strongly transversely tumid behind the clypeus, the pronotal angles depressed, the base of the elytra within the humerus abruptly depressed or excavated within, the front tibiae with the basal tooth submedian, not distinctly in front of middle, and the hind tibiae with more marked setose carinae. Differs from *bidentata* and *brevisetosa* also in the first three of the above characters.

RANGE: Atlantic coast of the United States from Rhode Island south to Florida, also the Gulf states to Texas (probably in the east), and north to southeastern Oklahoma and southwestern Arkansas. Approximately 250 specimens have been examined (see Appendix, also fig. 64).

HABITAT: Specimens from Florida have been collected as follows: on "*Quercus* sp.," "*Vitis*, sp.," "*Ostrya virginiana*," "*Quercus rubra*," and "hickory" in Madison County by F. N. Young, in April; "on laurel oak" in Gainesville, F. N. Young, in April, and "Muscadina," May, 1947; and a series "from pecan leaves," by F. W. Walker, April, 1930, in Jefferson County. A specimen taken by Young in April, 1946, in Alachua County is labeled "grape." In northeastern Texas two specimens taken in Daingerfield State Park on August 2, 1955, by L. J. Bottimer, were found in leaf litter (personal communication).

DESCRIPTION: Length, 7.5 to 9 mm. Color black or dark red, mandibles black at tips. Head transversely carinate or tumid behind clypeus, carina punctured, and, in many specimens, irregular in shape and interrupted at middle, head depressed behind carina in some specimens, rather densely but irregularly punctured, vertex with irregular impunctate areas in many specimens. Clypeal suture obsolete in most specimens. Clypeus not more than one-half of the length of head, densely punctured, front margin rounded from side to side in arc of a circle, scarcely reflexed except for a rolling back at middle of the slightly thickened margin, canthi not prominent, sides not sinuate. Eyes, antennae, palpi, mandibles, labrum, and mentum as in *harperi*.

Pronotum with punctures about same size as those on head, but varying on disc

from sparse and irregular to dense and confluent; sides strongly arcuate a little behind middle, thence evenly rounded or slightly sinuate to obtuse hind angles and right-angled or slightly acute front angles, angles slightly or strongly depressed; sides at middle within margin strongly bulbous, depression within basal angles either shallow or deeply excavate and extending in some specimens nearly to middle of base, this depression punctate and, in some specimens, pruinose. Scutellum and elytra as in *harperi*, except that elytra have base depressed near humerus and in some specimens distinctly tumid on each side of scutellum. Metasternum one and one-half times or twice longer than second abdominal segment. Hind coxal plate, pygidium, and propygidium as in *harperi*.

Front tibiae with three teeth about equidistant from one another, basal tooth near middle and very small, obsolete in some specimens. Hind femora as in *harperi*. Middle tarsi with first segment longer than second, hind tarsi as in *harperi* or with first two segments equal in length. Hind tibiae with setose carinae distinct and extending somewhat obliquely across face of tibiae. Claws as in *harperi*. Male genitalia as in figure 194; basal piece shorter than lobes.

SEXUAL DIMORPHISM: Males have longer first tarsal segments on the hind tarsi (same length as the longer spur, but segment shorter than spur in females), more transverse pygidium, longer hind tarsi, and narrower hind tibiae and femora than do females. The hind femora are rather bulbous in some females.

REMARKS: This species, while agreeing with those that precede (*urbana*, *blanchardi*, *fulva*, *texana*, and *harperi*) in the labrum and mentum and basally depressed pronotum, disagrees with them and approaches *bidentata* (*subcostata* group) by having the lobes of the male genitalia (fig. 194) stouter, not so elongate, and the teeth of the front tibiae equidistant, not bunched together in front of the middle (the basal tooth is median or obsolete, the apical tooth is very long). It is the only species in the eastern United States (as *subangulata* is the only one in the west) with the front of the head so strongly carinate, and in both species the carina varies from one that is slightly tumid to one that is a thick,

"pinched" roll standing far out from the forehead. In Mexico and Guatemala, there are some species in the *simplex* group that have a similar carina and they have also the same long labrum, sinuate mentum, and large mandibles as *punctatorugosa* and the allied species mentioned above.

The characters given in the diagnosis, with the addition of those of the labrum, mentum, and mandibles, and the semicircular clypeus with its slightly rolled-back and thickened front edge, separate this species from all others of the genus. The punctuation, however, varies considerably, especially that of the pronotum, and it is because of this variation and also because of the presence or absence of opaque areas on the pronotum that a number of forms have been described. The synonymy and the variation were discussed recently (Vaurie, 1954, pp. 50-52). Previously, Fall (1909) had intimated that these forms might be conspecific. I have now seen Fall's and LeConte's types, also long series of specimens from Florida which were not available to me in 1954, and I find that there are many intergradations of the various forms. In the series from Florida, some specimens have very sparse and fine punctures on the pronotum; some have the punctures sparse but larger than those on the head; a few have the base densely punctured and pruinose (a condition that seems to be more common but not exclusively so in individuals from South Carolina and Georgia); and a few have the punctures fairly dense. Of those with the pronotum so densely punctured that there are no impunctate areas (*densicollis*), some have the base of the pronotum opaque and some have it shining; some have it deeply excavate and some have it scarcely impressed. The contrast between the sparsely and the densely punctured pronota is very striking, but all gradations exist. The male genitalia of the various phases appear similar; they resemble those of *frondicola* but are stouter, and straight, not curved. In other species of the genus there occur also some widely different pronotal variations within the species in the shape, punctuation, and extent of opaque or eroded areas (*impar* and *persisae* in the *brevicollis* group, and the species of the *hebes* group).

Diplotaxis brevisetosa Linell

Figure 202

Diplotaxis brevisetosa LINELL, 1896, p. 400 (Brighton, Nueces County, Texas; syntypes, both females, in the United States National Museum). FALL, 1909, pl. 1, fig. 6 (clypeus and claw).

DIAGNOSIS: Differs from all other species in the genus in the combination of characters that follow: tiny size, hairy dorsum, rounded clypeus, flat labrum, wide epipleurae at apex, large, sparse punctuation on head and pronotum, hairy tarsi, absence of distinct costae on the elytra, and short metasternum (scarcely, if at all, longer than second abdominal segment).

RANGE: Southeastern Texas. A total of 55 specimens has been examined: two males, 10 females from "Texas"; Sutherland Springs, April, one male; Brighton, one male, four females (including syntypes); Milam County, May, 37.

HABITAT: The specimen from Sutherland Springs was taken "on grape" in April.

DESCRIPTION: Wings abbreviated in a few specimens, full in others. Length, 6 to 7 mm. Color dark red. Head hairy, gently sloping to clypeus, without interruption at suture, suture obliterated at middle, head with large, rather sparse punctures. Clypeus hairy, less than one-half of the length of head, punctures smaller and denser than those on head, front margin broadly reflexed and rounded from side to side in an arc of a circle; sides convergent, not sinuate; canthi not prominent. Eyes, antennae, palpi, and labrum as in *harperi*. Mandibles small, narrow. Mentum with declivity in anterior third posteriorly arcuately margined and pubescent, its surface flat.

Pronotum not especially transverse, with appressed pale hairs that are longer than space between punctures, punctures of disc similar to those of head, on sides somewhat denser, sides widest at middle, gently arcuate-sinuate to rather acute front angles and obtuse but sharp hind angles, the latter vaguely depressed within in some specimens; base slightly depressed in front of scutellum. Scutellum virtually impunctate. Elytra nearly three times longer than pronotum, with fine hairs in punctures of intervals, not of striae,

hairs slightly longer than width of a sutural interval, punctures of same size as those on pronotum but dense; second interval multipunctate; costae flat, not separable from intervals because of large punctures that fill costae; marginal hairs longer than width of a sutural interval; epipleurae wide at apex in some specimens. Metasternum not or scarcely longer than second abdominal segment. Hind coxal plate as in *harperi*. Pygidium as in *harperi* but convex in some specimens. Propygidium with distinct or indistinct spiracles and groove.

Front tibiae with teeth equidistant, the basal tooth in front of middle and very small, almost obsolete. Hind femora narrow as in *harperi* but sides not so straight. All tarsi with hairy pads below. Middle and hind tarsi with first segment longer than second, or hind tarsi with first two segments nearly of same length. Hind tibiae with setose carinae strongly oblique but indistinct. Claws as in *harperi*. Male genitalia about as in figure 202 of *subangulata*, but basal piece same length as lobes.

SEXUAL DIMORPHISM: The males have the pygidium distinctly transverse, not equal-sided and rather pointed at the apex as in females; the fifth abdominal segment is shorter than the fourth, not the same length as in females. Females seem to have shorter and wider hind tibiae, shorter and wider first hind tarsal segments, and longer and wider hind tibial spurs than do males. The hind femora are the same width in both sexes, and the soles of the tarsi are very hairy.

REMARKS: This species has a number of traits that differ from those of the preceding members of the section: the dorsum is hairy, the surface of the declivity of the mentum is flat, not sinuate or uneven, the metasternum is shorter (owing to the abbreviated wings), and the first segment of the hind tarsi is either the same length as or longer than the second, not shorter as in the other species.

As can be seen by the characters enumerated in the diagnosis, this is an unusual little species which nevertheless has characters common to a number of other species. It has the shape and sparse punctuation of the head, clypeus, and pronotum of *bidentata* LeConte (Atlantic and Gulf coasts but not Texas) of the *subcostata* group, also the same general kind of male genitalia, labrum, and mentum,

but *bidentata* has no dorsal hairs, has a longer metasternum, the second elytral interval with large punctures in single rows, not crowded punctures as in *brevisetosa*, and different front tibiae. Superficially, *brevisetosa* resembles *rex* and *rudis* (*rudis* group¹), which are also rather small in size, have dorsal hairs, rounded clypeus, and occur in Texas, but which differ principally by having the labrum cleft or bilobed, not flat. Another small Texas species with hairy tarsal pads as in *brevisetosa* (but in males only) and rounded clypeus is *dubia* LeConte, but that species has much longer tarsi, narrower, longer tibiae, long metasternum, dense punctuation on the pronotum, and no dorsal hairs. The hind tibiae of *brevisetosa* widen gradually from base to apex (not abruptly constricted before apex as in most specimens of *Diplotaxis*), and their distinctly oblique subapical setose carinae extend very close to the apex, much as in *languida* LeConte (Florida, Georgia), another small species with rounded clypeus and rather sparsely punctured pronotum, but *languida* differs by having wider hind femora, longer metasternum, shorter labrum, distinct elytral costae, elongate shape, and no dorsal hairs or hairy tarsal soles. Although it is stated in part 1 of this revision (1958, pp. 279, 297) that the hairy tarsi of *brevisetosa* are characteristic of males, it is now evident, upon examination of additional specimens, that females also have them, although perhaps in some specimens to a lesser degree.

There are both short-winged and fully winged specimens of this species, as is true also of *muricata* and *fimbriata*, and the length of the wing is not correlated with geographical areas. The dissected wing on a number of specimens appears to be a normal wing of full size, but the wing of a specimen from Sutherland Springs reaches no farther than the fourth abdominal segment and is not folded; it is 4 mm. long (total length of the beetle is 6.5 mm.) and terminates just beyond the pterostigma, as in figure 110 of the wing of *fimbriata* from Borego, California. In one of the specimens from "Texas" and in some from Milam County, the tip of the wing, which is folded under, is of less than normal length.

¹ See part 1 (Vaurie, 1958).

SECTION 3 OF THE SPECIES
GROUP *frondicola*

The seven species of this section (*corvina*, *sulcatula*, *punctipennis*, *trementina*, *puncticeps*, *muricata*, and *fimbriata*) occur in the southwestern part of the United States, and all but two of the species (*punctipennis* and *trementina*) have been taken also in northern Mexico; all but two (*corvina* and *fimbriata*) occur in Texas. They are characterized by having a large, convex pronotum, the elytra (except in the first interval) with single rows of punctures (occasionally blurred in *puncticeps*), the eyes widely spaced (often only the corner of the eye visible from above), the maxillary palpi impressed on their last segment, the propygidium strongly grooved, and the pygidium coarsely and deeply punctured (except in *puncticeps*). One species (*muricata*) has short dorsal hairs. The last species (*fimbriata*) is the only one with long marginal hairs, and in this and some other characters it approaches some of the species of the following section. The species are compared with *corvina*, except for *punctipennis* which is compared with *sulcatula*.

Diplotaxis corvina LeConte

Figures 177, 178

Diplotaxis corvina LECONTE, 1856, p. 272 ("Fort Yuma, Colorado River, California"; type, male, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, figs. 22, 31 (clypeus and claw).

DIAGNOSIS: Very similar to the two species that follow (*sulcatula* and *punctipennis*), but occurring farther to the west. It differs from them by having the clypeal suture deeply impressed (it is slightly impressed in some specimens of *punctipennis*), the labrum more deeply and abruptly concave (the posterior edge is sunk back), the inner wings not quite so long, the metasternum shorter, and the spiracles on the propygidium distinctly elevated and very prominent.

RANGE: Along the Colorado River from Blythe, California, and Ehrenberg, Arizona, to just south of the border of Sonora, Mexico, at San Luis. Twelve specimens have been examined (see Appendix).

DESCRIPTION: Wings not quite full, about as long as the beetle. Length, 10.5 to 12 mm. Color black. Head slightly convex, in some

specimens surface uneven; densely, confluent punctured, front interrupted by impression of clypeal suture. Clypeus punctured as on head, almost as long as head, margin truncate or very slightly emarginate in front, broadly rounded to sides, front third of margin broadly reflexed; sides not sinuate, but in some specimens slightly angulate over eyes. Eyes slightly sunk, flat on sides, each eye about one-sixth of the width of head. Antennae 10-segmented, club small (shorter than funicle) and no longer than last segment of maxillary palpi. Palpi with last segment shallowly but distinctly impressed at base. Mandibles not stout, but as long as labrum. Labrum strongly, evenly concave throughout except at front edge, faintly punctured, same length as under side of clypeus. Mentum with declivity of anterior third shallowly concave from side to side, its posterior edge pubescent and unevenly margined (almost scalloped), straight in some specimens.

Pronotum convex, punctures of disc a little larger and sparser than those of head, but dense in some specimens, center with a longitudinal impressed line or crease; sides widest at middle, thence gently arcuate to acute front angles and obtuse hind angles; base depressed in some specimens. Scutellum slightly wider than long. Elytra two and one-half times longer than pronotum, not very much longer than wide, punctures larger and sparser than those of pronotum; surface between punctures finely punctulate; second interval with a single row of large punctures as large as punctures of striae; costae flat or but slightly elevated, with very small punctures that are irregularly placed in some specimens; sutural interval with two rows or one irregular row of punctures; humeral and subapical callosities present, the latter not prominent; marginal hairs (in 10 specimens) no longer at middle than width of a sutural interval; reflexed sides of elytra as wide opposite the fourth abdominal segment as opposite the first; apices of elytra in some specimens with tiny hairs showing in punctures. Metasternum between coxae only slightly longer than second abdominal segment, slightly depressed at center. Hind coxal plate on sides angulate in front and extending onto elytral margin. Pygidium coarsely, confluent, reticulately punctured. Propygidium

with a deep, long, transverse groove, bisected in some specimens at center; spiracles very prominent.

Front tibiae with third or basal tooth more distant from second than second from apical, apex of third tooth at middle of tibiae. Hind femora wider than length of second abdominal segment, all femora with long hairs on upper edge. Middle and hind tarsi with first segment distinctly longer than second, hind tarsi as long as hind tibiae, hind tibiae with only three or four setae in subapical carinae. Claws shorter than one-half of claw segment, bent abruptly at apex, cleft near apex, but tooth outstanding from claw. Male genitalia as in figures 177 and 178; basal piece about equal in length to lobes.

SEXUAL DIMORPHISM: Males have the fifth abdominal segment at middle shorter than the fourth (about equal in females), the pygidium more retracted and more transverse than do females, but both sexes have the same apical flare to the hind tibiae, and the tibial spurs of about the same thickness and length (slightly longer than hind first tarsal segment).

REMARKS: This large, stout species is apparently rare in collections (only a dozen specimens having been examined by me) and appears to have a restricted distribution. LeConte (1856, p. 272) placed it in a category called "Spuriae" (along with *pacata*) because of the prominent posterior spiracles. Fall (1909, p. 63) considered that the prominence of the spiracles and the presence of three terminal spines on the hind tibiae (mentioned also by LeConte) were "not characters of importance." The terminal spines are present in most species but are often worn down. The spiracles are prominent also in *rufiola* and *subangulata*. The eighth sternite is very broad and has a blunt apex, as is true of the same sternite in *punctipennis*. The inner wings in two specimens dissected were scarcely longer than the length of the entire beetle, being 11.5 mm. on two individuals of 10.5 and 11 mm. in total length.

***Diplotaxis sulcatula* Fall**

Figures 43, 175, 176

Diplotaxis sulcatula FALL, 1909, p. 60, pl. 1, figs. 26, 29 (type locality not designated; type, female, is from Fort Bliss, Texas [at El Paso], in the Museum of Comparative Zoölogy).

DIAGNOSIS: Differs from *punctipennis* in the longer, less curved claws which are submedially, not subapically, toothed; longer middle tarsi; rather less concave labrum; wider epipleurae on the elytra; finer, less coarse, dorsal punctuation, especially on the head; and in the generally more opaque, not shining, surface, but is otherwise quite similar. Both species have a shorter, more convex, labrum than the others. (See also diagnosis of *corvina*.)

RANGE: Southern parts of Arizona, New Mexico, and Texas, south into northwestern Mexico in the states of Chihuahua and Coahuila. About 180 specimens have been examined (see Appendix).

DESCRIPTION: Length, 9 to 11 mm. Color black, dark red, or tawny. Head descending steeply to clypeal suture which is obliterated at middle, front flattened at middle, head finely, densely punctured. Clypeus as in *corvina*, except that it is about one-half or slightly more than half of the length of head. Eyes not sunk, each eye from one-fifth to one-sixth of the width of head. Antennae, palpi, and mandibles as in *corvina*, but antennal club longer. Labrum slightly convex in front, flat or slightly concave behind, shorter than (in some specimens same length as) and slightly advanced from the reflexed under side of clypeus, faintly punctured. Mentum nearly flat, but with declivity of anterior third posteriorly straight or arcuate, margined, and pubescent.

Pronotum as in *corvina*, but an impunctate space at center base of pronotum replaces crease in some specimens, and front angles are rectangular, not acute. Scutellum not wider than long. Elytra not quite two and one-half times longer than pronotum, punctures larger than those on pronotum; second interval with a single irregular row of large punctures that is double in some parts of the row in some specimens; costae flat, with row of tiny shallow punctures; suture, marginal hairs, and epipleurae as in *corvina*. Metasternum between coxae nearly twice as long as second abdominal segment. Hind coxal plate as in *corvina*. Pygidium densely but not deeply punctured, a few specimens with faint median sulcus. Propygidium as in *corvina*, but spiracles not prominent.

Front tibiae with teeth about equidistant, the basal tooth near middle. Hind femora at

least as wide as second abdominal segment is long. Middle tarsi with first segment slightly longer than second, hind tarsi with first segment shorter, tarsi as long as tibiae. Setose carinae of hind tibiae not jutting out on outer side. Claws longer than one-half of claw segment, gently curved, toothed at or slightly in front of middle. Male genitalia as in figures 175 and 176; basal piece about same length as lobes.

SEXUAL DIMORPHISM: As in *corvina*, with the additional fact that the male has the hind tibial spurs the same length as the first tarsal segment, and the middle and hind tarsi quite a bit longer and thinner than does the female. The first segment of the hind tarsi in females is markedly wider at the apex than at the base.

REMARKS: This species and *punctipennis* can readily be confused, because both species have a long, rounded-off clypeus with truncate (in some specimens slightly emarginate), but always strongly turned-back, front margin. In addition they have the same large, convex pronotum and stout elytra, with the marginal hairs short and the second interval with one row of punctures (the row is irregular in some specimens). The sides of the clypeus, however, are rather sharply angulate in front of the eyes in *punctipennis* (fig. 40), but in *sulcatula* they are either scarcely angulate or, as in the majority of specimens examined from Mexico, emarginate as shown in figure 43. The two transverse setose carinae of the hind tibiae are well marked in both species, but in *sulcatula* the larger (apical) carinae do not stand out so far from the surface of the tibiae or extend so far out on the outer side as they do in *punctipennis*. The difference in the claws, as stated in the diagnosis and as shown in Fall's figures, is not always distinct, as the tooth is not exactly at the middle in *sulcatula* but slightly in front, and in some specimens it might be considered subapical. The claws of all tarsi should be examined.

The lobes of the male genitalia are not very different from those of *corvina* (figs. 175, 177) from Arizona and California, which resembles *sulcatula* in general appearance and in the shape of the clypeus but which differs from *sulcatula* by having the clypeal suture deeply impressed, the labrum deeply and abruptly concave, the claws subapically toothed, the tarsi shorter, and the spiracles of the propygidium elevated and prominent.

Another species from Texas with the same general appearance is *trementina* Fall, but that species has the front of the clypeus scarcely reflexed, not broadly turned back as in *sulcatula* (figs. 42, 43). Fall's *thoracica* from Texas, a smaller species, which has the front clypeal margin reflexed but not so strongly, differs notably by having the second as well as the other intervals of the elytra crowded with small punctures and the claws cleft subapically. Lastly there is *beyeri* Schaeffer from Texas and northern Coahuila which has the same claws as *sulcatula* but differs by having the front of the clypeus longer and strongly emarginate, the eyes larger (each eye one-quarter of the width of head), the labrum only one-half as long as the under side of the clypeus, and different hind tibiae.

Although known from the border of Texas, this species has not been reported previously from Mexico. In the large series of 63 specimens taken by the David Rockefeller expedition to Mexico in 1947, the median impressed line of the pygidium which Fall found to be constant in his specimens is present in only 28 individuals; of 23 specimens examined from the United States it is present in only seven. Even when present, this line is generally not well marked.

The under side of the clypeus has a slight shallow furrow in some specimens which might cause this species to be keyed out to the *brevicollis-haydenii* group.

The lobes of the genitalia of the male are the same as in *punctipennis*, but the basal piece is longer in the latter species. The eighth sternite is pointed, not blunt as in both *punctipennis* and *corvina*.

Diplotaxis punctipennis LeConte

Figures 40, 175

Diplotaxis punctipennis LECONTE, 1856, p. 268 (Texas, here restricted to southern Texas; two syntypes, females, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, figs. 27, 30 (clypeus and claw).

DIAGNOSIS: Similar to *corvina* in most characters but generally smaller, with the clypeal suture not, or scarcely, impressed, the hind tibiae with strong and distinct, not weak, setose carinae, and the labrum less deeply concave. Differs from the similar *sulcatula* principally by having coarser and denser punctua-

tion, the front of the head confluent punctured, the claws toothed more apically, and the tibial carinae stronger. (See also diagnosis of *trementina*.)

RANGE: Southern Texas. Twenty specimens have been examined: Three (including the syntypes) without further locality than Texas; Uvalde, June, seven; Austin, June, one; Sabinal, May, 1910, four; Val Verde County, May, 1948, five.

DESCRIPTION: Agrees with the description of *sulcatula* (which precedes), except as follows: length, 8 to 12 mm.; color black (one specimen light brown); punctures of head confluent in most specimens and, although fine and dense, actually larger than in *sulcatula*; clypeus in some specimens almost as long as head, not emarginate in front of eyes, but with prominent angulate canthi (fig. 40); pronotal punctures coarser; elytra with epipleurae in most specimens narrowing towards apex, and the costae in some specimens scarcely discernible among the coarse punctures; pygidium with larger and deeper punctures than in *sulcatula* and no median sulcus; hind tibiae with strongly carinate and thickly setose subapical carinae extending across tibiae; claws not longer than one-half of claw segment and toothed subapically. Male genitalia as in figure 175 of *sulcatula*, but basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: As in *corvina*.

REMARKS: I have found this species misidentified in collections as *sulcatula*, and indeed they are very much alike (see *sulcatula* for comparisons). It is evidently both less abundant than *sulcatula* and more restricted in distribution.

Characteristics not given in the description include the prominent carinae of the hind tibiae which, in profile view, stand out from the side of the tibiae; the shiny integument (tiny punctulations, however, are present in some of the non-punctate areas); and the middle and hind tarsi which are shorter than in *sulcatula*. The eighth sternite is very broad and has the apex blunt, as in *corvina*, not acuminate as in *sulcatula*. The male genitalia differ slightly from those of *corvina*, being similar to those of *beyeri* and *sulcatula* (figs. 175, 177).

The clypeal suture is faintly visible at the middle in the syntypes.

Diploaxis trementina Fall

Figures 42, 83, 84

Diploaxis trementina FALL, 1909, p. 69, pl. 1, figs. 36, 37 (La Trementina [Trementina, San Miguel County], New Mexico; type, female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: This species resembles both *punctipennis* and *sulcatula*, but differs by being smaller and by having the clypeus shorter (only one-half of the length of the head), its front margin not nearly so strongly reflexed, the pronotum sparsely punctured on the disc, the hind tarsi very short, and the elytra with a dull, not glossy, surface, on which the punctures are distinct and separate.

RANGE: New Mexico, southern Arizona, and southwestern Texas. A total of 25 specimens has been examined (see Appendix).

DESCRIPTION: Length, 7.5 to 10 mm. Color brownish red to black. Head gently declivous, front on same plane as clypeus and equally densely punctured, some punctures confluent at center near clypeal suture which is obliterated at middle in most specimens. Clypeus about one-half or less of the length of head, moderately reflexed in front (in some specimens by only the width of the margin), truncate or slightly or distinctly emarginate in front between rounded angles, sides oblique, very slightly sinuate or bluntly angulate in front of eye in some specimens. Eyes, antennae, palpi, and mandibles as in *corvina* but antennal club longer. Labrum and mentum as in *corvina*, except that labrum is longer than reflexed under side of clypeus in most specimens, is distinctly punctured, and is not so deeply concave posteriorly.

Pronotum as in *corvina*, except that punctures on disc are much sparser than those on head, and center crease is replaced in most specimens by impunctate longitudinal space. Scutellum not wider than long. Elytra two and one-half times longer than pronotum, punctures larger than those on pronotum and as sparse as those on pronotal disc, surface rather opaque, dull; second and sutural intervals, costae, and marginal hairs as in *corvina*; epipleurae in most specimens not widened at apex; subapical callosities distinct. Metasternum nearly twice as long as second abdominal segment. Hind coxal plate, pygidium, and

propygidium as in *corvina*, except that groove and spiracles of propygidium are not so distinct.

Front tibiae as in *corvina*. Hind femora scarcely if at all wider than second abdominal segment is long. Middle tarsi as in *corvina*, hind tarsi with first two segments about equal in length, hind tarsi shorter than hind tibiae. Setose carinae of hind tibiae distinct on outer edge only, not across face of tibiae. Claws about one-half of the length of claw segment, bent abruptly and cleft near apex, tooth close to claw. Male genitalia as in figures 83 and 84 of *punctata*; basal piece about equal in length to lobes.

SEXUAL DIMORPHISM: As in *corvina*, except that the shape of the pygidium is not constant, and females have the first segment of the hind tarsi shorter and markedly wider at the apex, and the hind tibial spurs wider, than do males.

REMARKS: This species seems allied to the others of the section in the majority of characters, but the clypeus is slightly hexagonal and not so well rounded in front, and it is also much less strongly reflexed and more emarginate than in *corvina*, *sulcatula*, and *punctipennis* (figs. 40, 42, 43). The hind tarsi are shorter than the hind tibiae, as they are also in *muricata*, a species that differs principally by having dorsal hairs.

A species that is superficially similar and occurs also in Texas is *maura*, but that species has a truly emarginated clypeus, a very long and large labrum, and a few hairs on the dorsum of the elytra.

The male genitalia (figs. 83, 84) are about the same as those of another species occurring in Texas (*punctata*), which differs from all the species of the present group by having the sides of the abdomen ridged. Only one-sixth of the specimens examined are males.

***Diplotaxis puncticeps* Moser**

Figure 175

Diplotaxis puncticeps MOSER, 1918, p. 310 ("Mexico," type locality here restricted to northern Mexico; type, male, in the Zoologisches Museum, Berlin).

DIAGNOSIS: The sparsely punctured pygidium and the non-median position of the basal tooth of the front tibiae distinguish this spe-

cies from others of the section. It resembles most closely *trementina*, but is larger and differs further by having the labrum somewhat convex, and advanced from the under side of the clypeus. In the latter character and in the male genitalia it agrees with *punctipennis* and *sulcatula*, but differs from those species by having the front margin of the clypeus scarcely, not strongly, reflexed and the labrum longer.

RANGE: From the state of San Luis Potosi (west of Valles) northwestward through Coahuila and Durango into southern Texas and southern New Mexico. Also, possibly, as far south in eastern Mexico as the state of Puebla (one specimen). A total of 53 specimens has been examined (see Appendix).

DESCRIPTION: Length, 9 to 12 mm. Color black or dark red. Head gently declivous, front on same plane as clypeus and equally densely punctured as there, some punctures confluent at center near clypeal suture in some specimens, suture obliterated at middle in most specimens. Clypeus punctured as on head, one-half or more than one-half of the length of head, front margin scarcely emarginate (truncate in type), reflexed only by thickness of margin, angles rounded, sides oblique, not sinuate. Antennae 10-segmented, club as long as or longer than funicle and longer than last segment of maxillary palpi. Eyes as in *corvina*, but each eye about one-fifth of the width of head. Palpi and mandibles as in *corvina*. Labrum slightly or distinctly convex in front, gently concave behind, advanced from surface of under side of clypeus (not advanced in type), apparently impunctate, about (or nearly) twice longer than reflexed under side of clypeus, front margin arcuate. Mentum nearly flat in most specimens, but with apical declivity distinctly indicated in anterior third or fourth by margined and pubescent posterior edge, declivity flat.

Pronotum as in *corvina*, except that punctures of disc are finer and more sparse than those of head, and the longitudinal center crease is replaced in most specimens by a wider impunctate space; base not depressed. Scutellum not wider than long, virtually impunctate. Elytra about two and one-half times longer than pronotum, punctures at

least twice as large and equally sparse as those on pronotum; second interval with a more or less single row of punctures (at least in basal half) as large as punctures of striae, the row of punctures irregular and becoming double in some specimens (as in type, for example); costae flat, wider than one sutural interval in a few cases, with single row of minute punctures; sutural interval with scattered minute punctures; humeral and subapical callosities present; marginal hairs slightly longer than width of a sutural interval (shorter, perhaps worn, in type); reflexed sides of elytra narrowing to apex. Metasternum between coxae not quite twice as long as second abdominal segment. Hind coxal plate as in *corvina*. Pygidium sparsely punctured (rather densely in type, but punctures not touching). Propygidium grooved, spiracles not prominent.

Front tibiae with basal tooth in front of middle, other two teeth bunched together. Hind femora not or but slightly wider than length of second abdominal segment. Middle and hind tarsi as in *corvina*, but first two segments of hind tarsi in some specimens (as in type) about equal in length. Carinae of hind tibiae and claws as in *corvina*, except that claws are somewhat longer. Male genitalia as in figure 175 of *sulcatula*, but basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *corvina*, except that the hind tibial spurs are narrower and shorter in males than in females (in the latter they are longer than first segment of hind tarsi), and the first segment of the hind tarsi is longer and narrower in males. This segment in females has the surface extremely roughened and punctured, but is rather smooth in males.

REMARKS: In addition to the characters given in the diagnosis, this species, when in fresh condition, differs further from those preceding it by having longer marginal hairs on the margins of the elytra.

The specimens from Durango and Coahuila in Mexico, and from the southwestern United States, are fairly uniform (with minor differences in the punctuation of the second elytral interval), but the two males from eastern Mexico and the type specimen have the labrum somewhat different. In the type and the male from San Luis Potosi, the labrum is

flatter in front than in other specimens, and is not advanced from the surface of the under side of the clypeus, and the clypeus, from above, seems rather longer (being as long as one-half of the length of the head). However, the male genitalia, the sparsely punctured pronotum and pygidium, as well as other characters, agree with those of the more western and northern specimens. The locality Rascon is rather far east in San Luis Potosi (it is just west of Valles) and is between Coahuila to the northwest and Puebla to the southeast. A male specimen from Puebla (Tehuacan), on the other hand, has the labrum exceedingly convex (more so than in the species *convexilabrum* in which, however, the labrum is very small), the front angles of the pronotum blunt (worn?), and the second interval of the elytra with more than one row of punctures, even in the basal half of the elytra. All other characters appear to agree with those of the other specimens.

It is interesting to note that all but two of the series of 31 specimens from the vicinity of Pedricena in southern Durango are females and that females are more common also in the other specimens represented in the collection.

A species with about the same kind of pronotum, front tibiae, and general aspect as *puncticeps* is *bakeri* Cazier (also from Coahuila and possibly from Texas), which differs from *puncticeps* by having the front of the clypeus distinctly emarginate at middle, the elytra densely punctured, especially the second interval, the labrum deeply hollowed out, and the mentum concave.

***Diplotaxis muricata* Schaeffer**

Figures 66, 195–198

Diplotaxis muricata SCHAEFFER, 1907, p. 62 (Alpine, Texas; type, male, in the United States National Museum). FALL, 1909, pl. 1, fig. 7 (clypeus and claw).

Diplotaxis sparsesetosa SCHAEFFER, 1907, p. 63 (Texas; type, deposited in Museum of Brooklyn Institute, not found in the United States National Museum, which has Schaeffer's other types from Brooklyn). New synonymy.

Diplotaxis hispida FALL, 1909, p. 29, pl. 1, fig. 8 ("New Mexico," type, male, is from Deming, New Mexico, in the Museum of Comparative Zoölogy). New synonymy.

DIAGNOSIS: Very similar to *fimbriata* from

farther west, having about the same kind of head, clypeus, labrum, and mentum but differing by having a hairy dorsum, very short marginal hairs, shorter tarsi, and subapically, not medially, toothed claws. Differs from the tiny *brevisetosa* (Texas), which also has short dorsal hairs and rounded clypeus, by having the labrum hollowed out, not flat, the head with dense, not sparse, punctuation, the tarsal soles not abundantly hairy, and the second interval of the elytra unipunctate.

RANGE: From northern New Mexico and Texas south through Chihuahua, Coahuila, and Nuevo Leon to southern Durango, Mexico; also the southeastern corner of Arizona. Approximately 300 specimens have been examined (see Appendix).

DESCRIPTION: Wings slightly reduced in some specimens. Length, 8 to 12 mm. Color black or red-brown. Head with short, appressed hairs, front on same plane as clypeus and evenly convex with it, densely punctured. Clypeal suture obliterated at middle in most specimens. Clypeus with short, appressed hairs, punctured as on head, about one-third or one-half of the length of head, front margin rounded from side to side, not or scarcely reflexed, canthi not prominent. Eyes, antennae, mandibles, and maxillary palpi as in *corvina*, but club as long as funicle. Labrum and mentum as in *corvina*.

Pronotum as in *corvina*, except that it has short dorsal hairs and no crease in center (in some specimens an impunctate space is present); some specimens have the sides very strongly arcuate and the base depressed and with a line of punctures. Scutellum not wider than long. Elytra with hairs in all but the striae punctures, hairs either shorter or slightly longer than the space between the punctures, elytra a little more than twice as long as pronotum, in some specimens longer, punctures larger than those on pronotum and denser in most specimens, second interval with a single row of large punctures; costae in some specimens not differentiated from other intervals, but in others with a row of smaller punctures, punctures muricate in some specimens, suture with two rows of punctures, humeral and subapical callosities present; marginal hairs as in *corvina*; reflexed sides narrowing to apex. Metasternum between the coxae from one and a half times to nearly

twice longer than second abdominal segment. Hind coxal plate, pygidium, and propygidium as in *corvina*, but spiracles somewhat less prominent.

Front tibiae as in *corvina*. Hind femora narrower than length of second abdominal segment. Middle tarsi with first segment only slightly longer than second, hind tarsi with first two segments about equal in length, hind tarsi shorter than hind tibiae. Claws as in *corvina* but somewhat less abruptly bent. Male genitalia as in figures 195 to 198; basal piece variable, usually shorter than lobes.

SEXUAL DIMORPHISM: As in *corvina*, except that the hind tibial spurs are narrower in the male than in the female.

REMARKS: Possibly this species could be separated into two on the basis of some differences found in the male genitalia. These differences, however, not only do not seem to be correlated with either the described (see synonymy) or observed (by me) external differences, which are, in any case, very slight, but also they are not constant. Some populations (from New Mexico, Texas, and Mexico) have the genitalic lobes (a) noticeably dorsally elongate and narrow throughout and (in profile) curved downward near the middle. Other populations (from Arizona, New Mexico, Texas, and Mexico) have them (b) short, rather bulbous apically, and (in profile) horizontal (see figs. 195-198). However, from Saltillo, Primavera, and Parral in Mexico, and Del Rio and Alpine, Texas, there are individuals with the lobes short and horizontal as in b, but narrow throughout as in a; and some from La Gloria, Coahuila, Mexico, have them short as in b, but curved and narrow as in a. In addition, from some localities (Del Rio, Texas; Saltillo, Mexico) both types (a and b) are present in the same population. There is even more variability in the shape of the eighth sternite which may be acuminate or rounded or truncate at the tip in specimens from various localities.

The only external differences that I can find among specimens are that about 15 of the approximately 300 specimens examined (including the types of *muricata* and *hispida*) have the hairs of the elytra distinctly longer (as long as the space between the longitudinal rows of punctures), whereas all others (including all the specimens from Mexico ex-

cept from Delicias in Chihuahua) have very short hairs (including the type of *sparsesetosa*, not examined, according to Schaeffer). In another species (*sordida*), both long- and short-haired forms are considered to be the same species. Although most, but not all, of the long-haired specimens have short, flat genitalia of type b, the short-haired ones have either a or b. A few of the long-haired individuals (Alpine, Texas) have the inner wings shorter, about three-quarters of the normal length, and the metasternum and elytra consequently also somewhat shorter, but they have the humeral and subapical callosities sharp as in fully winged beetles. Other characters that differ individually but show no correlation with either the length of the hairs or the male genitalia are as follows: dense or sparse punctuation of the pronotum and elytra; sides of the pronotum strongly or only slightly arcuate; elytral punctures muricate or not, elytral costae indistinct because of crowded punctures, or distinct and with the punctures in more or less regular rows; the size of the scutellum; the impression of the clypeal suture; and the length of the tarsal segments.

The type of *hispidia* Fall (Deming, New Mexico) and two paratypes (Deming and Albuquerque) were compared with the type of *muricata* Schaeffer (Alpine, Texas), and I find them to be synonymous. All four specimens are about 8 mm. long (the "5 mm." given by Schaeffer for *muricata* is evidently a typographical error), and have long hairs on the elytra; the genitalia of the Albuquerque paratype are of type b. The metasternum is a little longer in the New Mexico specimens. The clypeal suture, which both Fall and Schaeffer mention as a diagnostic character, is obliterated at the middle in the type of *muricata* and in the Albuquerque paratype of *hispidia*, but is present in the type and paratype of *hispidia* from Deming. The unique type of *sparsesetosa* ("Texas") has not been found in recent years, but Schaeffer remarks (1907, p. 6) that it differs from *muricata* "in being more robust, the elytra widening towards apex, much shorter and finer pale hairs and the elytra punctuation different." As reported by Fall (1909, p. 30) Schaeffer compared *sparsesetosa* with *hispidia* and found the

former differed by having the clypeal suture indistinct, the hairs shorter, the costae distinct, the punctuation of the elytra, pygidium, and abdomen denser, deeper, and coarser, the two apical teeth of the front tibiae closer together, and the basal segment of the hind tarsus shorter. [The latter character, which Fall uses in his tabular key (1909, p. 12) to separate *hispidia* and *muricata*, is generally sexual, females having this segment shorter and wider.] I believe that *sparsesetosa* must be the same as the large number of short-haired specimens examined from Mexico and elsewhere and that it is not specifically distinct from *muricata*. In view of the extreme plasticity represented, I do not see how more than one form can be maintained.

Diplotaxis fimbriata Fall

Figures 44, 67, 68, 109–112, 175

Diplotaxis fimbriata FALL, 1909, p. 56, pl. 1, fig. 25 (Palm Springs [Riverside County], California; type, female, in the Museum of Comparative Zoölogy).

Diplotaxis arta CAZIER, 1940b, p. 136 (Cedar Canyon, Providence Mountains, San Bernardino County, California; type, male, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: Similar to *muricata* (which does not occur in the same area) in many respects but differs from it by having very long, not short, marginal hairs on the elytra, no hairs on the dorsum itself, and medially, not subapically, toothed claws. It agrees with *pacata* (also found in California and Baja California) in the marginal hairs and claws, but differs from it by having the head and clypeus evenly convex without depression at the suture, the pygidium very coarsely and rugosely punctured, the pronotum longer, less transverse, and different male genitalia.

RANGE: Southern California south into northern Baja California, Mexico, as far as San Felipe (fig. 44). A total of about 400 specimens have been examined (see Appendix). A female from Osborne, Osborne County, north central Kansas (collected by C. and P. Vaurie in August, 1952), with short, not folded, wings, must have been labeled in error.

HABITAT: A series of 35 specimens from

Cronise Valley, San Bernardino County, California, were taken on *Hymenoclea*, a shrub of the aster family, by P. D. Hurd, Jr., in April, 1956, and one specimen from Borego, San Diego County, was taken on *Franseria*, a genus that is listed close to *Hymenoclea* in Standley (1924, p. 1522). The type and five paratypes of "*arta*" were collected by W. F. Barr in June, 1940, on *Franseria eriocentra* Gray.

DESCRIPTION: Wings reduced, folded or not folded, or wings of full size. Length, 8 to 12 mm. Color black or reddish brown, or black with elytra red. Head with front on same plane as clypeus and evenly convex with it, densely punctured. Clypeal suture obliterated at middle. Clypeus rather convex, punctured as on head, about one-half or a little more, of the length of head, front margin rounded from side to side but slightly truncate or even sinuate in some specimens, reflexed a little more than the thickness of the margin, canthi not prominent. Eyes, antennae, mandibles, palpi, labrum, and mentum as in *corvina*, except that club of antennae is not so short and labrum is not so deeply concave.

Pronotum as in *corvina*, except that center in most specimens has impunctate area, elevated or not, of varying extent and actually filled with tiny punctulations; sides more arcuate than in *corvina*. Scutellum wider than long in most specimens. Elytra as in *corvina*, except that sutural interval has only one row of punctures in most specimens, that marginal hairs are longer than scutellum and emerge in two distinct rows, one on edge of elytra and one on reflexed margin, and that apical callosities are distinct in fully winged specimens. Metasternum as in *corvina* but much longer in specimens with full wings. Hind coxal plate, pygidium, and propygidium as in *corvina*, except that spiracles are not prominent.

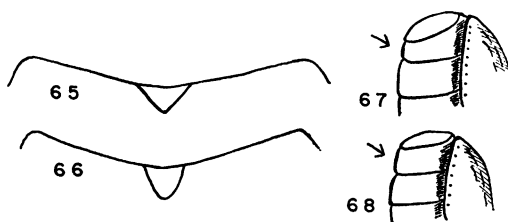
Front tibiae, hind femora, and middle tarsi as in *corvina*, except that femora are not (or but slightly) wider than length of second abdominal segment, all femora with long hairs on upper edge. Hind tarsi with first two segments nearly equal in length, tarsi of about same length as hind tibiae. Claws longer than one-half of the length of claw segment, scarcely curved, the tooth distinctly median

in position, shorter than and distant from apex of claw. Male genitalia as in figure 175 of *sulcatula*; basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: As in *corvina*, with the additional fact that the hind femora appear somewhat wider in females. In both species the best indication of the sex is the relative length of the fifth segment of the abdomen. Seen in profile, with the insect held perpendicularly to the apical margin of the fourth segment, the apex of the fifth segment is parallel to the fourth in females, but dips downward in the males (figs. 67, 68).

REMARKS: In fresh specimens the long "fimbriate" marginal hairs that give the species its name are quite striking, being often twice as long as the scutellum, and very dense. The hairs are long also on the sides of the pronotum and on the femora and trochanters. Some other species, however (*pacata*, *subangulata*, *haydenii*, and *dahli*, to mention a few), have hairs almost as long.

This is one of the few species in the genus with partially or greatly reduced wings (Fall, 1909, p. 56, noticed the "ovate" shape, but evidently did not dissect the wings), but the wings are never so minute as they are in some of the species of the *connata* group, for example, in which they are no longer than the metepisternum. A study of the dimorphic wings of this species, as made by Jackson (1928) of the weevil, *Sitona hispidula*, and by Darlington (1936) of carabids would be well worth while (the University of California at Berkeley and the University of Idaho, Moscow, have between them about 350 specimens of this species). It would also be inter-



FIGS. 65, 66. Shape of scutellum. 65. *D. connata* group. 66. *D. muricata*.

FIGS. 67, 68. Sexual difference in length of fifth abdominal segment in *Diplotaxis fimbriata*. 67. Male. 68. Female.

esting to know whether the fully winged members can fly, because Jackson (1928, p. 728) found that in *Sitona* "perfectly formed wings persist even although the muscles responsible for flying may be so abnormally constituted as to be incapable of functioning."

Darlington (1936, p. 154) says that in the carabids "long and short winged individuals of dimorphic species occur together," and that "the two forms are not dependent on geographical isolation." These last two statements appear to be true of *fimbriata*, for at Palm Springs, Hopkins Well, Painted Canyon, Cedar Canyon, Victorville, Quail Springs, and perhaps other localities in California, I have seen individuals within the same populations with the wings of various lengths. I do not know, however, whether all these populations have individuals with wings of the maximum length, but some do.

There appear to be a number of types of reduced wings. Those only slightly reduced are of normal length to the pterostigma (reaching in repose as far as the fourth segment of the abdomen), but have the apical folded part of the wing beyond the pterostigma shortened; those reduced further are too short to be folded under at the apex and extend only to the third abdominal segment; those that are virtually vestigial are no longer than 3 or 4 mm. In much reduced wings, the shape and venation change (see figs. 109-112). In the relatively small number of wings examined by me, two of 3 and 4 mm. have been seen on individuals of 9 and 9.5 mm. in total length (from Palm Springs); wings of 5 mm. on a specimen of 9 mm. (Borego); of 6 mm. on one of 11 mm. (Yermo); of 8 and 10 mm. on individuals of 11 and 10 mm., respectively (Painted Canyon). These localities are in San Bernardino, Riverside, and San Diego counties; none of these wings mentioned is really full; a full wing is longer than the total length of the beetle. From San Felipe, Baja California, however, the situation is different in that in all the specimens examined for wings (two females and eight males), the wings were full (15 mm. long, for example, on an individual of 11 mm.). From two localities in San Bernardino County, there are also many individuals with full wings, but in these places (Victorville, and Cedar Canyon in the Providence Mountains) only the males have full

wings, the females having slightly reduced, but folded, wings. At Quail Springs in Joshua Tree National Monument, some males, at least, have full or nearly full wings.

There seems to be considerable variability in the shape of the pronotum, elytra, and legs which may be due to the brachypterous condition. Some specimens of both sexes have rather stout elytra and broad pronotum, whereas some males are more elongate. All the elongate specimens that have been dissected are fully winged, but the stouter ones may have either full or reduced wings. In elongate specimens the metasternum is more than twice the length of the second abdominal segment and in some of the stout ones nearly that long; in other stout specimens it is shorter, but it is at least slightly longer than the second abdominal segment in all specimens. All the elongate and some of the stout individuals have prominent humeral and subapical callosities on the elytra, but the majority of specimens have the subapical callosities virtually obliterated. Some of the elongate type were described as a distinct species, *arta*, from Cedar Canyon, the type and two of the five paratypes being males (three paratypes were not examined). This species was said to differ from *fimbriata* (Cazier, 1940b, p. 137) "by its narrower pronotum, subparallel elytra, prominent humeral umbones, by having the pronotum and elytra fimbriate with short golden hairs and by having the metasternum longer." These characters serve to differentiate some males (all the males from Cedar Canyon and Victorville), but many males from a large series (360) from Quail Springs have the pronotum and elytra as stated for "*arta*," but the marginal hairs very long and the metasternum rather short as in *fimbriata*. If these Quail Springs males are "*arta*," then the shorter hairs on the type series of *arta* and on the males from Victorville must be worn, and the other characters given for "*arta*" apply only to males. I believe, however, that there is only one species concerned and that it includes the elongate, fully winged males (Cedar Canyon and Victorville), the fully winged males and females (San Felipe), the elongate, not quite fully winged males (Quail Springs), and the stout, short-winged males and females. In support of this belief, the genitalia of all males examined seem to be alike, both the "*arta*"

and the *fimbriata*-like individuals may have the pronotum black and the elytra red, and both have been collected from the same genus of plants.

The majority of the 400 or more specimens examined are in the collections of the University of California at Berkeley and of the University of Idaho at Moscow.

SECTION 4 OF THE SPECIES GROUP *frondicola*

These species are generally smaller than those in the preceding section and have a smaller, shorter, more transverse pronotum, with subangulate sides, but agree with them in having a distribution west of the Mississippi River. All four species occur in northern Mexico as well as in the western United States; all but one species (*pacata*) have been collected in Texas, but apparently western and southern Texas only. The other species (*subangulata*, *rufiola*, and *carbonata*) are compared with the first one (*pacata*).

Diplotaxis pacata LeConte

Figures 41, 44, 59, 200, 201

Diplotaxis pacata LECONTE, 1856, p. 276 ("Valley of the Gila" [Gila River], Arizona; type, female, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 25 (clypeus and claw).

DIAGNOSIS: Very similar to *carbonata*, *rufiola*, and *subangulata*, but differing from them by having the claws toothed distinctly at the middle, not near the apex (fig. 59), by having in many specimens large dimples or transverse impressions on each side of the middle of the pronotum, and by having the front margin of the clypeus broader and more evenly arcuate from side to side (fig. 41). Differs from those individuals of *subangulata* that have the tooth of the claws more nearly median by having different male genitalia (figs. 200–203), more punctate scutellum, flat, not concave clypeus, and the head scarcely tumid.

RANGE: Southwestern United States (including California but not Texas), south into Sonora and northern Baja California, Mexico (fig. 44). A total of about 170 specimens has been examined (see Appendix).

DESCRIPTION: Length, 7 to 9 mm. Color black or dark red, some specimens tawny. Head evenly convex or, in some specimens,

with a slight post-clypeal convexity; finely, densely punctured; two round depressions at vertex in a few specimens. Clypeal suture obliterated at middle. Clypeus flat, punctured as on head, about one-half of the length of head, front margin rounded from side to side in a flattened arch, reflexed by width of margin only or slightly more in some specimens; canthi not angulate. Eyes slightly sunk, each eye one-fifth or one-sixth of the width of head. Antennae 10-segmented. Mandibles not large. Maxillary palpi with last segment not truly impressed, but with large flattened spot. Labrum rather flat in front, scarcely concave behind, same length as or longer than under side of clypeus, densely punctured, very wide. Mentum with declivity in apical third posteriorly margined and pubescent.

Pronotum strongly transverse, punctures of disc of same size as those of head, but sparser, sides widest a little behind middle, bulbous and subangulate, angles obtuse, many specimens with deep, large impressions laterally. Scutellum not wider than long, variable in punctuation. Elytra three times longer than pronotum, punctures larger and deeper than those of pronotum; second interval with single row of large punctures; costae flat, their punctures in single row and tiny; marginal hairs as long as scutellum, longer in some specimens. Metasternum between coxae only slightly longer than second abdominal segment. Hind coxal plate with somewhat angular projection at sides that extends onto elytral margin. Abdomen with second segment tumid in some specimens. Pygidium with punctuation dense in some specimens, sparse in others. Propygidium with deep transverse groove; spiracles elevated and prominent in most specimens.

Front tibiae with three teeth approximately equidistant from one another, the basal tooth submedian. Hind femora no wider than length of second abdominal segment and rather straight on lower edge. Middle tarsi with first segment longer than second, hind tarsi with first two segments about equal in length. Claws scarcely curved, unguis tooth distinctly median, shorter than claw (fig. 59). Male genitalia as in figures 200 and 201; basal piece same length as lobes.

SEXUAL DIMORPHISM: The male has the pygidium more transverse and more strongly

retracted than the female, the fifth segment of the abdomen being much shorter at the middle than the fourth. In the female this segment is only slightly shorter, and the pygidium is elongate, more or less triangular. The narrow hind tibial spurs and their relation to the hind first tarsal segment (slightly longer) are about the same in both sexes, although the longer spur is the same length as the first segment in some males (distinctly longer in all females).

REMARKS: This species agrees in some ways with the species of the preceding section, especially *fimbriata*, and in some ways with those of the present section. It has the distinctly medially toothed claws of *fimbriata*, and in some specimens the hairs on the elytral margins, femora, front coxae, and metasternum are equally as long as in *fimbriata*. It differs from *fimbriata* by being generally smaller and by having the pronotum and pygidium more shallowly and sparsely punctured, the last segment of the palpi flattened but not deeply impressed, and the head and clypeus usually interrupted by the depression of the suture between them, not forming one smooth curve from vertex to front. These two species have been taken together at a number of localities in southern California (Palm Springs, Blythe, Mecca, White Water), and in June, 1952, and October, 1953, at San Felipe in northeastern Baja California, but *pacata* has a wider distribution. *Diplotaxis pacata* is not, however, nearly so common as *carbonata*, *rufiola*, and *subangulata*, nor so widespread. I have seen only 160 specimens of *pacata* and a total of more than 5000 of the other three combined. All four species occur in Sonora, only *pacata* and *subangulata* occur in Baja California, and all but *rufiola* are evidently more common in the United States than in northern Mexico.

Although the metasternum is quite short, the wings of the few individuals dissected are of normal length.

***Diplotaxis subangulata* LeConte**

Figures 44, 61, 202, 203

Diplotaxis subangulata LECONTE, 1856, p. 271 (Oregon; type, male, in the Museum of Comparative Zoölogy).

Diplotaxis californica SCHAEFFER, 1907, p. 66 (Tulare County, California; type, male, in the

United States National Museum). New synonymy. FALL, 1909, pl. 1, fig. 23 (clypeus and claw).

DIAGNOSIS: Differs from allied forms principally by having the front of the head more distinctly and broadly tumid. In spite of confusing variability, the species can be distinguished from others of the section by the combination of the tumid head, the distinctly impressed, not merely flattened, last segment of the maxillary palpi, the proportionately longer pronotum, the less concave labrum, and the more concave clypeus.

RANGE: British Columbia in Canada south to southern Baja California (fig. 44) and Sonora, Mexico, east to Kansas (probably western Kansas) and western Texas. Between 2500 and 3000 specimens have been examined (see Appendix).

HABITAT: Two specimens (with "pinched" forehead) from Yermo, California, were taken on *Croton californicus* in June, 1940, by W. F. Barr; and two pairs *in copula* and 24 other specimens at Summer Lake, Oregon, June, 1952, "on sage at dusk," by V. Roth.

DESCRIPTION: Length, 6 to 9 mm. Color as in *pacata*. Head as in *pacata*, except that a post-clypeal convexity is always present. In some specimens it is only slightly tumid, in some it is an exaggerated, elevated, "pinched" ridge that extends also backward along the eyes. Head behind ridge depressed, in a few specimens triangularly, or surface unequal, tumidity or ridge in some specimens interrupted at middle. Clypeal suture obliterated. Clypeus concave, about one-half or less than one-half of the length of head, front margin truncate, in some specimens with slight emargination at middle, sides broadly rounded, front third of clypeus reflexed; a few scattered hairs present in some individuals. Eyes, antennae, and mandibles as in *pacata*. Palpi with last segment distinctly impressed dorsally. Labrum and mentum as in *pacata*, except that labrum is somewhat less concave behind.

Pronotum variable in shape and punctuation, transverse or not so transverse, sparsely or densely punctured with large or small punctures, sides strongly subangulate behind middle, in some specimens sinuate in front, angles obtuse. Scutellum and elytra as in *pacata* except that elytra are less than three

times longer than pronotum. Metasternum, hind coxal plate, abdomen, propygidium, and spiracles as in *pacata* but metasternum longer. Pygidium densely, rugosely punctured.

Legs as in *pacata*. Claws variable, either toothed near middle almost as in *pacata* or subapically (figs. 59, 61). Male genitalia as in figures 202 and 203; basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *pacata* in some specimens, but in many specimens the sexual distinctions are very slight.

REMARKS: This species is the only one of the entire group found as far north as Oregon and British Columbia. It has a very wide geographical range in the western United States and northern Mexico, being especially abundant in Arizona, California, and northern Baja California. Except for a series of some 1000 specimens collected by W. J. and J. W. Gertsch in July, 1953, at Santo Tomas, south of Ensenada in northern Baja California, very few specimens are available from northern Mexico (I have seen 20 specimens from Chihuahua, 17 from Sonora, and eight additional ones from Baja California). In Baja California it reaches Agua Caliente¹ at the tip of the peninsula, from whence three males (dissected) have been seen. At the same time and place, six males and six females of the similar *missionaria* were collected, and both species also at Catavina farther north: in California both species (dissected) occur at Jacumba and in the Santa Rosa Mountains. In two other localities (El Refugio and San Domingo), it occurs with the similar *australis* (fig. 44). In these localities and elsewhere, *subangulata* can be distinguished from the two species mentioned by its more subangulate and strongly cut-back sides of the pronotum; by its single, not double, row of large punctures in the second elytral interval; by the usually more tumid head behind the clypeus; by the somewhat less apically toothed claws; and, in the male, by the absence of bristly tarsal pads, and different genitalia. All these characters may vary except the genitalia.

Schaeffer described those specimens with the more pronounced or "pinched" ridge on

the head as *californica*, which Fall (1909, p. 52) considered a variety of *subangulata*. I have examined the types of both forms, and, although they differ in respect to the ridge, they are otherwise similar. The type of *californica* has the post-clypeal convexity more tumid than do the majority of specimens from Santo Tomas, but not so strongly "pinched" as some specimens from Yermo and Palm Springs, California; the prominence of the transverse swelling, as remarked by Schaeffer (1907, p. 66), "gives the clypeus, together with the reflexed front margin, the appearance of being deeply excavated"; the claws are more than one-half of the length of the claw segment, gently curved, the apex of the tooth slightly in front of the middle (Schaeffer called the tooth "median"). In the type of *subangulata* the head has but a feeble convexity and the clypeus is not so reflexed. However, after examining at least 2000 individuals, I find that there are all gradations of convexity and that, although the head is often more tumid in specimens from California ("*californica*"), it is not always so, and in specimens from Utah, Arizona, Washington, and elsewhere it may or may not be just as tumid. In the large series from Santo Tomas, it is strong and pinched in some, feeble in others; in specimens from Sonora it is scarcely tumid at all. Therefore I consider these forms conspecific and *californica* a synonym.

A slight post-clypeal convexity is present in some specimens of both *pacata* and *rufiola*, which occur in some of the same areas, but these species do not have the last segment of the palpi impressed, nor the pygidium coarsely and densely punctured, nor the clypeus so concave. Some *rufiola* (from Texas and Coahuila) have the convexity as strong as in many *subangulata* (see remarks under *rufiola*).

The variability in *subangulata* concerns not only the head, but other parts as well: the marginal hairs in some specimens are almost as long as the hairs in *fimbriata*; the second interval of the elytra in a few individuals has two rows of punctures instead of the usual single row (as in some of the series from Santo Tomas); the clypeus may have a slight sinuation at middle and a few scattered hairs behind the front edge; the abdomen may have

¹ The specimens from Agua Caliente may have been mislabeled; they were probably collected farther north (see also footnote under *missionaria*).

the second segment tumid at middle or not; the sides of the pronotum are more strongly sinuate or angulate in some specimens; the claws appear to be toothed nearer the middle in some specimens; and the general size and robustness vary.

I do not know the possibilities of hybridization in the genus, but I have available two mounted specimens from Tucson, Arizona (collected by F. Parker in August, 1952) in which the internal sac of the male is inserted more than halfway into the abdomen of the female. The female is the species *subangulata*, and the male is *planidens*. The latter species is common also throughout Arizona, and has been taken in Sonora in company with *subangulata* near Llano. It is very similar to *subangulata*, but differs by having the pronotal sides scarcely arcuate, not subangulate, the pronotum longer, the eyes larger, the second interval of the elytra usually multipunctate, the hind tarsi of the male very hairy on the first two segments, and the male genitalia widened abruptly at the apex.

The lobes of the male genitalia (figs. 199–203), although quite similar to those of *pacata*, *carbonata*, and *rufiola*, are always proportionately shorter and stouter, and the basal piece of the genitalia is distinctly longer than the lobes, not shorter or of the same length as in the others.

Diploptaxis rufiola Fall

Figures 39, 60, 69, 193, 199

Diploptaxis rufiola FALL, 1909, p. 63, pl. 1, figs. 32, 33 (Deming, New Mexico; type, male, in the Museum of Comparative Zoölogy).

Diploptaxis fulva ROBINSON [not LeConte], 1946, p. 58 (Washington County, Utah; type said to be in the collection of the author). New synonymy.

DIAGNOSIS: The claws are narrower and are cleft more distinctly at apex than in the other species of this section, and the tooth is closely appressed, not outstanding. Many specimens are exceedingly like those of *carbonata*, and some are like those of *subangulata* (see below).

RANGE: Southwestern United States (including Texas but not California), south through northern Mexico, and the state of Guanajuato (fig. 69). Approximately 1300 specimens have been examined. (See Appendix for further data.)

HABITAT: A specimen from Portal, Ari-

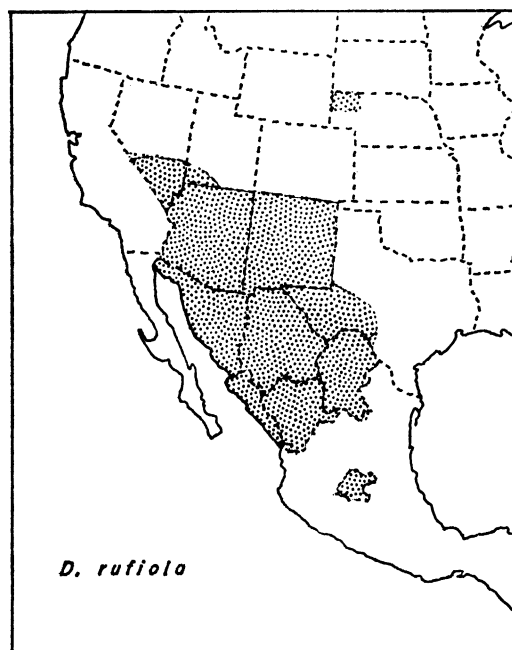


FIG. 69. Distribution of *Diploptaxis rufiola*.

zona, was taken on *Acacia greggii* by P. D. Hurd, Jr., and one from San Juan del Rio, Durango, on *Baccharis glutinosa*, according to data on the labels.

DESCRIPTION: Length, 6.5 to 8.5 mm. Color tawny or dark red, an occasional specimen black. Head and clypeus as in *pacata*, except that most specimens have no depressions on the head, and the sides of the clypeus are more convergent to the narrower front, the shape being rather like a horseshoe (fig. 39). Clypeal suture present and impressed in most specimens. Eyes, antennae, mandibles, palpi, labrum, and mentum as in *pacata*.

Pronotum and scutellum as in *pacata*, except that there are no large lateral depressions on pronotum. Elytra as in *pacata*, except that the punctures on the second interval are in irregular double rows in some specimens. Metasternum, hind coxal plate, abdomen, pygidium, propygidium, spiracles as in *pacata* but metasternum longer; the pygidium in some specimens has no more than four or five punctures.

Front tibiae with basal tooth at middle and more distant from two apical teeth than they are to each other. Hind femora and middle and hind tarsi as in *pacata*. Claws bent

abruptly and cleft near apex, tooth shorter than claw but scarcely separated from it. Male genitalia as in figure 193 of *frondicola* and figure 199 of *carbonata*; basal piece same length as or slightly shorter than lobes.

SEXUAL DIMORPHISM: As in *pacata*.

REMARKS: This small reddish species with the spoon-shaped clypeus is almost as abundant as *subangulata* and reaches farther south in Mexico (to Guanajuato). It is found with *subangulata* and two other similar species (*pacata* and *carbonata*) in many localities. The clypeus is flat, not concave as in *subangulata*, the marginal hairs of the elytra are longer than in *carbonata*, and the ungual tooth is at the apex of the claw, not at the middle as in *pacata*. The claw tooth is pressed so close to the claw (fig. 60) that it does not interrupt the line of the lower edge of the claw and tooth together, whereas in the other species, the claw tooth, even when it is placed near the apex, stands away from the claw and extends below the line of the lower edge. The four types of claw are shown well in Fall's plate (1909, figs. 23, 25, 32, and 33); the differences are slight, but in conjunction with other characters they are diagnostic.

In the great numbers of this species examined there is a good deal of variation in the shape and length of the clypeus, in the convexity of the head, and in the punctuation of the pygidium and the elytra (second interval). The only localities where there is some doubt as to the identification of the specimens are in southern Texas and in Coahuila at Saltillo. A series of 70 individuals from the latter place, although agreeing in every other way with individuals from other localities, nevertheless have the front of the head either vaguely tumid or with a distinct transverse ridge as in *subangulata*. These specimens were in fact thought at first to be *subangulata*, but the pygidium is sparsely punctured, very sparsely in some specimens, the claws are narrow and apically cleft, the last segment of the maxillary palpi is merely flattened at base, not with distinct oblong impression as in *subangulata*, and the genitalia of the male are like those of specimens of *rufiola*. Twenty-five specimens from Boquillas, Brewster County, on the Texas border, have the head ridged also, and they are, in addition, much darker than any other individuals of *rufiola*. Smaller

series from The Basin in Big Bend Park, from Presidio, Van Horn, Hot Springs, Marathon, and Castolon, all in Texas, show only a slight degree of tumidity on the head. Evidently *subangulata* is not so common in Texas, but I have seen a series of 14 from Marathon taken on the same date as a specimen of *rufiola*, and four from Van Horn taken on the same date as four of *rufiola*. All the specimens of *subangulata* from these localities can be separated from *rufiola* by their impressed palpal segments and their denser, coarser punctuation on the pygidium, and, with more difficulty, by the relative characters of less concave labrum and less apically placed claw tooth.

In contrast to the Texas and Coahuila populations, a series of 350 specimens from Pedricena, Durango, is quite uniform in having a smooth head, as is true of the majority of other *rufiola*.

The type has the second interval of the elytra distinctly unipunctate and the surface rather opaque, not shining. I have not seen the type of *fulva* Robinson, but the author has kindly sent me a paratype, which appears to be the same species as *rufiola*.

Diplotaxis carbonata LeConte

Figures 61, 193, 199

Diplotaxis carbonata LECONTE, 1856, p. 270 ("New Mexico and Texas"; type, male, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 32 (clypeus and claw).

Diplotaxis levicula CASEY, 1885 (1884-1885), p. 178 (Arizona; type, female, in the United States National Museum). New synonymy.

Diplotaxis arcuata FALL, 1909, p. 75, pl. 1, figs. 44, 45 (Phoenix, Arizona; type, male, in the Museum of Comparative Zoölogy). New synonymy.

DIAGNOSIS: This species differs from others of the section by having shorter marginal hairs on the elytra (the hairs may be longer than a sutural interval is wide, but not so long as the scutellum), and the pygidium generally proportionately larger.

RANGE: Southwestern United States (including Texas but not California) south into Sonora, Chihuahua, Nayarit, Sinaloa, and Jalisco, Mexico. A total of 670 specimens has been examined. (See Appendix for data.)

DESCRIPTION: Length, 6 to 8.5 mm. Color

black or dark red, an occasional specimen tawny. Head, clypeus, eyes, antennae, mandibles, palpi, labrum, and mentum as in *pacata*, except that vertex of head has no depressions, declivity of mentum is more marked, its ridge stronger, and front of clypeus is less evenly arcuate (more as in fig. 42 of *trematina*). Clypeal suture impressed in some specimens.

Pronotum and scutellum as in *pacata*, except that there are no lateral depressions on pronotum, and the sides are less bulging. Elytra as in *pacata*, except that the second interval has irregular double row of punctures in some specimens, and the marginal hairs at the middle are not much longer than the width of one sutural interval. Metasternum, hind coxal plate, pygidium as in *pacata*, except pygidium is larger and metasternum longer. Propygidium with groove obsolete in some specimens and spiracles not prominent.

Front tibiae, hind femora, and middle and hind tarsi as in *pacata*. Claws bent rather abruptly and cleft near apex, apex of unguis well separated from claw, shorter and thicker than claw. Male genitalia as in figure 193 of *frondicola*, but profile view as in figure 199; basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *pacata*.

REMARKS: This species resembles *rufiola* more closely (in the head, clypeus, pronotum, elytra, and male genitalia) than the other species. It differs, however, by being more often black than red or light brown in color, by having shorter marginal hairs (never so long as the scutellum), and the unguis of the claw wider than the claw and separated from it (fig. 61). Both species, as well as *subangulata*, occur in many of the same localities. The claws are about the same as in *subangulata*, which has a rugosely punctured pygidium, narrower clypeus, with more reflexed front margin, the front of the head transversely tumid, and the maxillary palpi distinctly impressed on the last segment.

A large series of about 550 specimens of *carbonata* from El Paso, Texas (collected in June, 1947, by members of the David Rockefeller expedition to Mexico), are quite uniform in size, color, and other characters.

The type of Fall's *arcuata* (Phoenix, Arizona) has been examined, and, although it is tawny, not black, and has the second elytral

interval with two rows of punctures and the clypeus somewhat shorter and narrower than in many specimens, it seems to be the same species as *carbonata*.

The type of *levicula* Casey, a female, from "Arizona," which is dark red in color, appears also to be the same as *carbonata*. Fall (1909, p. 95) placed this form in synonymy with *punctata* LeConte, but if he had raised the elytra on the type specimen he would have seen that *levicula* does not have the ridge on the sides of the abdomen characteristic of *punctata* and others of the *truncatula* group.

SPECIES GROUP *PLANIDENS*

The following five species compose this group: *Diplotaxis planidens* Fall; *ambigua* Fall; *australis*, new species; *missionaria*, new species; and *anthracina* Fall. These species show some similarities with the species of the *frondicola* group (especially with *subangulata*), but they differ by having the pronotum generally longer, less transverse, and with its sides less arcuate (except in *missionaria*). The males differ by having either dissimilar claws on one or two pairs of legs or some or all segments of the tarsi very hairy ventrally. The male of one species (*anthracina*) has the middle and hind tibiae very hairy on their inner margins. The clypeus in some *planidens*, *missionaria*, and *anthracina* is more or less rounded from side to side as in the species of the *frondicola* group, but the contour of the front margin varies considerably in all species of the *planidens* group. Minute hairs are visible at the apex of the elytra in some individuals, as is true for a number of "glabrous" forms in other groups also. One species (*ambigua*) has hairs on the clypeus. The epipleurae or reflexed margins of the elytra are not widened at the apex as in the *brevicollis* group.

These species all have about the same mandibles (small), palpi (deeply impressed on last segment), antennae, mentum, metasternum, hind coxal plate, and apically cleft claws (except in some males). The eyes are sunk or depressed except in *anthracina*. The labrum is about the same, being flat or slightly convex, finely punctured, the front margin arcuate, the length about the same as that of the under side of the clypeus. The male genitalia of

planidens and *ambigua* differ from any others seen in the genus (fig. 204).
Nearly 1300 specimens have been examined, including the types of all the forms. The two species from Baja California (*australis* and *missionaria*) account for 800 of the specimens. Each species is compared with the first, *planidens*. No habitat notes are available to me.

DISTRIBUTION OF THE SPECIES

Two of the species (*ambigua* and *planidens*) inhabit Arizona and neighboring Sonora, in northern Mexico; the three others are found in Baja California, although one (*missionaria*) crosses into southern California in small numbers.

KEY TO THE SPECIES OF THE *planidens* GROUP

- 1. Front tarsi with inner claw¹ twice as large as outer *anthracina* male in part
Front tarsi with claws equal in size 2
- 2. Second interval of elytra with but a single row of punctures, and front of head strongly transversely tumid; males with claws, tarsal soles, and tibial hairs normal . . . *subangulata*²
Second interval of elytra multipunctate, and front of head at most slightly tumid; males either with modified claws or with very hairy tarsi ventrally, or hairy hind tibiae . . . 3
- 3. Disc of clypeus distinctly hairy . . . *ambigua*
Disc of clypeus glabrous 4
- 4. Front margin of clypeus distinctly longer than either side margin; eyes not sunk below sides of head; sides of pronotum gently curved from base to apex, widest part of pronotum at middle; Baja California . . .
. *anthracina* in part
Front margin of clypeus of about same length as or scarcely longer than either side margin; eyes sunk slightly below sides of head; sides of pronotum more strongly curved at base than from behind middle to apex, widest part behind middle; Baja California and elsewhere 5
- 5. Arizona, and Sonora, Mexico; male with outer middle claw³ enlarged (fig. 73) and genitalia as in figure 204 *planidens*
Baja California, Mexico (and southern California); male with middle claws normal and equal in size and genitalia as in figures 205-207 6

¹ "Inner claw," i.e., with legs in normal forward position.
² See *frondicola* group for discussion of this species.
³ "Outer claw," i.e., with legs in normal position for middle legs, or extending backward.

- 6. Males with long hairs or hairy pads on all tarsi; clypeus with front margin usually emarginate at the middle (even if weakly so) and angles prominent, though blunt; eyes usually larger (each eye one-fourth or one-fifth of width of head); southern half of peninsula *australis*
Males with long hairs on first two segments of hind tarsi only; clypeus with front margin truncate, rounded angles not prominent; eyes smaller (each eye one-fifth or one-sixth of width of head); northern half of peninsula and southern California . . . *missionaria*

Diplotaxis planidens Fall

Figures 70, 73, 204

Diplotaxis planidens FALL, 1909, p. 65 (Jerome, Arizona; type, male, in the Museum of Comparative Zoology).

DIAGNOSIS: Very similar in general to *ambigua*, but differs as shown in table 3.

RANGE: Arizona south to southern Sonora, Mexico. Approximately 150 specimens have been examined. (See Appendix for further data.)

DESCRIPTION: Length, 6.5 to 8.5 mm. Color black or dark red. Head convex to clypeal suture which is obliterated at middle; front of head with a tumid concentration of punctures behind clypeus, densely punctured, in some specimens confluent punctured in front. Clypeus without hairs, one-half or less than one-half of the length of head, front margin either truncate or slightly emarginate, and shallowly reflexed between rounded angles, or, as in a few specimens, rounded from side to side; sides not sinuate, punctures the same as on head or slightly larger. Eyes sunk below level of head, each eye about one-quarter of the width of head. Maxillary palpi with last segment deeply impressed at base, the impression one-half or more of the length of the segment. Mandibles small. Antennae 10-segmented. Labrum flat in front, level with and the same length as the reflexed under side of clypeus, concave behind, finely punctured, front margin strongly arcuate. Mentum with anterior declivity in apical third posteriorly margined and pubescent.

Pronotum only slightly wider than long, punctures of disc of same size as but sparser than those on head, on sides dense, sides widest behind middle whence gently sinuate to

TABLE 3
SPECIFIC CHARACTERS IN TWO SPECIES OF THE *planidens* GROUP OF *Diplotaxis*

	<i>planidens</i>	<i>ambigua</i>
Both sexes		
Clypeus	Not hairy; sides obliquely convergent to front, not strongly indented in front of eyes; virtually flat, front margin truncate, scarcely reflexed; shorter	Abundantly hairy; sides in most specimens strongly indented (emarginate) in front of eyes; concave, front margin emarginate and strongly reflexed; longer
Elytra	Marginal hairs, when not worn, as long as scutellum	Marginal hairs shorter, about as long as one sutural interval is wide
Head ^a	Front tumid, "bumpy," and with concentrated confluent punctures on tumidity, but not ridged	Front virtually flat, punctures dense, but not usually confluent, front elevated over clypeus by slight transverse ridge or "frown"
Size	Generally smaller; type is 6.5 mm.	Generally larger; type is 8.5 mm.
Color	Generally black	Generally black or dark red, clypeus usually red
Males		
Tarsal claws	Outer claw on middle legs flattened, expanded, and sinuate behind tooth (fig. 73)	Outer claw either slightly expanded and sinuate behind tooth (fig. 71) or normal
Tarsal segments	Normally hairy or, in some specimens, thickly hairy on first two segments of hind tarsi	Thickly hairy on all legs, forming hairy pads in some but not in all specimens

^a This character is variable in both species.

the rather acute and forward-drawn front angles and gently arcuate to hind angles that are obtuse but with a sharp turned-down angle. Elytra scarcely more than twice as long as pronotum, punctures of same size or slightly larger, second interval with double rows of punctures that become a single row in front in some specimens; costae flat, with smaller punctures; marginal hairs at middle longer than width of one sutural interval, at front in some specimens as long as scutellum. Metasternum at least one and one-half times longer than hind femora are wide, hind coxal plate laterally angulate, acute angle extending over to reflexed elytral margin. Pygidium large, with large, deep, and either sparse or dense punctures. Propygidium with indistinct groove, distinct spiracles.

Front tibiae with third tooth at middle or slightly in front of middle and farther from apical teeth than they are from each other. Hind femora as wide as second abdominal segment is long, not bulbous. Middle tarsi with first two segments equal in length, or first segment slightly longer than second, hind

tarsi with first segment shorter than second in most specimens. Hind tarsi not longer than tibiae. Claws bent angularly, cleft subapically, tooth close to claw. Male genitalia as in figure 204; basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: The male has the outer claw of the middle tarsus broadly laminate and enlarged (fig. 73), the soles of the first two segments of the hind tarsi somewhat more hairy than in the female, and the hind tarsi longer (tarsi in the female shorter than hind tibiae). The hind femora are rather wide and sinuous in the female, nearly straight and narrower in the male. The shape of the pygidium and the relation of the length of the hind tibial spurs to the basal tarsal segment do not appear to be sexually dimorphic.

REMARKS: This species and *ambigua* (which follows) have the same geographic distribution, even occurring in some of the same localities in Arizona and Sonora. They are also so similar morphologically (including the male genitalia), that at one time I considered them to be one variable species. This cannot

be so, however, because those individuals with hairs on the clypeus (*ambigua*) are found to possess, on detailed examination, a number of characters that differ from those of individuals with no hairs on the clypeus (*planidens*); thus the absence of hairs is diagnostic and not owing to wear. Fall (1909) did not mention the clypeal hairs of *ambigua*, nor the slightly enlarged middle claw, but he distinguished the two species by the "broadly laminiform" middle claw of the males of *planidens* and the hairy tarsi of males of *ambigua*. The types (examined) of both species are quite different in appearance and in the characters just mentioned, but certain specimens are not so distinctly separable. Those individuals that have the diagnostic hairs worn (on clypeus, margins of elytra, and male tarsi) must be compared according to other characters, some of which are rather variable, as the shape of the side and front margins of the clypeus (the amount of emargination), and the degree of convexity of the front of the head.

The species *subangulata* (*frondicola* group) occurs also in some of the same localities as *planidens* in Arizona (although its entire range is much wider) and it can be very similar, in some of its variations, to *planidens*, *australis*, and *missionaria*. *Diplotaxis planidens*, however, can be distinguished generally by the non-bulging sides of the pronotum, the more apically toothed claws, the smaller and more numerous punctures of the second elytral interval, and more concave labrum; it can be distinguished positively by the apically flaring lobes of the male genitalia (fig. 204), and by the modification, in the male, of the outer claw of the middle tarsus (fig. 73), a readily visible and constant character. Although the latter character was considered by Fall (1909, p. 6) as "unique in the genus . . . possibly a sexual character," the males of two of his other species (*anthracina* and *ambigua*) have it also, but to a lesser degree and not so constantly.

I have examined a pair composed of a male of *planidens* and a female of *subangulata* (collected by F. M. Parker, August 5, 1932, in Tucson, Arizona) in which the internal sac of the male is more than halfway inserted into the abdomen of the female. It would be of interest to know if there are hybrids between these species or among other similar species.

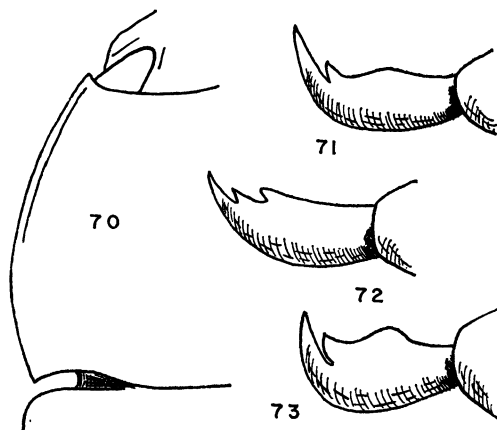


FIG. 70. Pronotal outline characteristic of *Diplotaxis ambigua* and *D. planidens*.

FIGS. 71-73. Outer claw of middle tarsus of males of *D. planidens* group. 71. *D. ambigua*. 72. *D. ambigua*, variation from Minas Nuevas, Sonora. 73. *D. planidens*.

Diplotaxis ambigua Fall

Figures 70-72, 204

Diplotaxis ambigua FALL, 1909, p. 66, pl. 1, fig. 35 (Rincon Mountains, Arizona; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: This species resembles *planidens* very closely but differs as shown in table 3. It differs from *australis* and *missionaria* by having hairs on the surface of the clypeus.

RANGE: Arizona south to southern Sonora, Mexico. Approximately 260 specimens have been examined. (See Appendix.)

DESCRIPTION: Length, 7 to 9 mm. Color dark red or black, the clypeus red in many specimens. Head rather flat, but with a transverse ledge or frown behind the clypeal suture, which is obliterated at the middle, densely punctured. Clypeus concave, abundantly hairy, one-half or more than one-half of the length of the head, front margin emarginate and broadly reflexed between broadly rounded angles, sides strongly indented or sinuate in front of eyes, punctures dense, slightly larger in some specimens than punctures of head. Eyes, palpi, mandibles, antennae, labrum, mentum, pronotum, and elytra as in *planidens*, except that hairs on elytral margins are not longer than width of one sutural interval. Remaining characters as in *planidens*.

SEXUAL DIMORPHISM: As in *planidens*, except that the male has all tarsal segments very hairy, the hairs in some specimens abundant enough to form tarsal pads, and the male has the middle outer tarsal claw only slightly enlarged (fig. 71).

REMARKS: In spite of the hairs on the clypeus, a characteristic of the *trapezifera* species group, *ambigua* seems not to belong with that group, because it has the propygidium grooved above the pygidium and the hind coxal plate strongly angulate at the sides and extending over to the elytral margin. (The coxal plate is very slightly angulate in three of the Baja California species of the *trapezifera* group.) Furthermore, *ambigua* is more similar to *planidens*, which has no clypeal hairs, than it is to the species of the other group, having many characters similar to those of *planidens*, as shown in the description above.

The species is quite variable, however, in some respects. Fall (1909, p. 66), who had 10 specimens, found the form of the clypeus "so variable that with certain specimens in hand—more especially males—the species might naturally be referred to the group with angulate clypeus, where the hairy tarsi would associate it with *tarsalis*." The middle claws, as shown in figures 71 and 72, vary in size. A male from Vinaterio, Sonora, has the flattened basal part expanded as strongly as in *planidens*, but three males from Patagonia, Arizona, have the middle claws virtually normal in size. The apices of the genitalia of the male are always expanded laterally (fig. 204), but much more so in some specimens than in others. Although the hairs on the clypeus are sufficiently abundant so that some are almost always present, the hairs on the tarsal soles are often as thin as they are in *planidens* (perhaps from wear).

***Diplotaxis australis* Vaurie, new species**

Figures 44, 205, 207

TYPE MATERIAL: Type, male, 20 miles north of Comondu, Baja California, Mexico, July 23, 1938, Michelbacher and Ross, collectors, in the California Academy of Sciences, and 30 male paratopotypes in that institution and in the American Museum of Natural History.

DIAGNOSIS: Extremely similar to *mission-*

aria and *planidens*, but differing from them by having the front of the clypeus slightly emarginate, not so truncate, or the angles more sharp than rounded, and by having, in the male, long golden hair on the soles of all the tarsi. The male genitalia are not widened abruptly as they are in *planidens*. (See diagnosis of *missionaria*.)

RANGE: Baja California from the Cape region (about 100 specimens) north to Santa Rosalia which is south of the dividing line between the northern and southern districts of the peninsula (fig. 44). (See Appendix for the 503 specimens examined.)

DESCRIPTION OF TYPE, MALE: Length, 8 mm. Color dark red. Head as in description of *planidens*, front somewhat confluent punctured. Clypeus without hairs, about one-half of the length of head, front margin slightly emarginate and strongly reflexed between broadly rounded, prominent angles, sides slightly sinuate in front of eye, punctured as on head. Eyes, palpi, mandibles, antennae, labrum, and mentum as in *planidens*, but the labrum is slightly longer than reflexed under side of clypeus.

Pronotum as in *planidens*, but front angles more right than acute. Elytra as in *planidens*, except marginal hairs at middle as long as scutellum. Metasternum, hind coxal plate, pygidium, and propygidium as in *planidens*, with punctures of pygidium rather sparse.

Legs and front and hind claws as in *planidens*, except that first segment of middle tarsi is longer than second, and first two segments of hind tarsi are about equal in length. Genitalia as in figures 205 and 207; basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: The type (a male) has thick long bristly hairs on the soles of the first four segments of all the tarsi, the hairs especially abundant on the first two segments of the hind tarsi, where they obscure the surface. Females have quite bristly hairs, but far fewer, and not obscuring the surface. Males have the first segment of the hind tarsi scarcely wider than the second, whereas females have it distinctly wider. Remaining characters as in *planidens*, except that males have no modification of the middle claw.

VARIATIONS FROM TYPE: Some specimens are darker than the type, with the head rather flat, not so convex in front, the labrum

slightly longer, the eyes somewhat more separated. Some specimens have the groove on the propygidium distinct and the punctures of the pygidium either sparse or dense. The first segment of the hind tarsi seems to be shorter than the second in some specimens. The length ranges from 7 to 9 mm. The clypeus in a few specimens is quite strongly emarginate, but in some is as truncate as in *missionaria*.

REMARKS: This species was tentatively marked by a former student of the group, Mont A. Cazier, as "new sp. close to *subangulata*." I considered it at first either as one of the many variations of that variable species, or as a possible subspecies of *ambigua* or *planidens* (Arizona and Sonora, Mexico). It occurs within the range of *subangulata* (even in two of the same localities, El Refugio and San Domingo in Baja California), and south and/or west of the range of *ambigua* and *planidens*. In spite of the same general appearance, there are many differences between *australis* and *subangulata*, principally the less arcuate sides of the pronotum of *australis*, its larger eyes, slightly convex but not tumid head, more emarginate front of the clypeus, more punctate second interval of the elytra, and, in the male, the genitalia and the bristly hairy tarsi. *Diplotaxis australis* resembles *ambigua* and *planidens* in the pronotal sides, large eyes, slightly convex head, slightly emarginate clypeus, and second elytral interval, but differs from them in the male genitalia (figs. 204, 205) and by having no enlargement of the base of the middle tarsal claw in the male. This enlargement (figs. 71, 73) is not always noticeable in *ambigua*, which has tarsi in the male almost as hairy as those of *australis*, but *ambigua* differs distinctly from *australis* by having abundant hairs on the clypeus and much shorter hairs on the margins of the elytra. The middle claw in the male is always distinctly enlarged in males of *planidens*, which differ further from males of *australis* by not having all the tarsi hairy. It is curious that *ambigua* and *planidens* have, respectively, the same tarsal differences as *australis* and *missionaria*, the first member of each pair having all tarsi hairy, the others having the hairs restricted to the first two segments on the hind legs.

Of three other species from Baja California,

of which hundreds of specimens were collected by members of the California Academy of Sciences, two (*academia* and *confusa* of the *trapezifera* group) are apparently endemic; the third (*moerens* of the *moerens* group) occurs also in the southwestern United States and is polytypic. Four additional endemic species that are not at all abundant are apparently confined to the southern Cape region (*polita*, *parpolita*, *mascula*, and *flexa*). Unless some of these species should be found to be synonymous, nine of the 15 species known to occur in Baja California are endemic (the two others are *anthracina* and *punctulata*). This is an even higher percentage than found by Barr (1950, p. 486) in the Cleridae in which "nearly one-half of the species known to occur in Lower California are endemic to the peninsula, several of these being restricted to the subtropical Cape Region."

***Diplotaxis missionaria* Vaurie, new species**

Figures 44, 206, 207

TYPE MATERIAL: Type, male, 15 miles north of San Ignacio, Baja California, Mexico, July 26, 1938, Michelbacher and Ross, collectors, in the California Academy of Sciences; 30 male paratopotypes in that institution and in the American Museum of Natural History.

DIAGNOSIS: Differs very little from *australis*, but has a more rounded, less hemihexagonal, clypeus without prominent angles, the front margin not emarginate; more widely spaced, smaller eyes, and, in the male, fewer bristly tarsal pads. There is no laminate middle claw as in the male of *planidens*, and no hairs on the clypeus as in *ambigua*, and the head is not coarsely tumid as in most specimens of *subangulata*.

RANGE: From San Diego County and the California-Mexico border south to San Ignacio in the northern part of the southern district of the peninsula (fig. 44). A total of 304 specimens has been examined, including the paratypes (see Appendix).

DESCRIPTION OF TYPE, MALE: Length, 8 mm. Color dark red. Head as in description of *planidens*, front somewhat confluent punctured. Clypeus without hairs, one-half of the length of head, front margin truncate and scarcely reflexed between rounded angles,

punctures no larger than those on head, sides not sinuate. Eyes sunk, each eye one-fifth of the width of head. Palpi, mandibles, antennae, labrum, and mentum as in *planidens*.

Pronotum as in *planidens*, except that it appears more transverse. Elytra as in *planidens*, except that they are almost three times longer than pronotum, and marginal hairs at middle are as long as scutellum. Metasternum, hind coxal plate, pygidium, and propygidium as in *planidens*, with punctures of pygidium rather sparse.

Legs and front and hind claws as in *planidens*, except that first segment of middle tarsi is longer than second, hind tarsi with first segment slightly shorter than second. Male genitalia as in figures 206 and 207; basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: As in *australis*, except that the long bristly hairs are present in the males on the first two segments only of the hind tarsi and even there are less thick than in *australis*.

VARIATIONS FROM TYPE: The size ranges from 7 to 8.5 mm. Some specimens have a slight emargination of the clypeus, some have a shallow round depression between the eyes; some have a deep and distinct groove behind the pygidium; in some the labrum is longer than the under side of the clypeus, and the sides of the pronotum are subangulate. In some males the hind tarsi seem not any more hairy than in females, but these few may have the hairs worn.

REMARKS: This species was found abundant in the vicinity of San Ignacio by the collectors, Michelbacher and Ross (1942, p. 8) at their camps at 15, 45, and 50 miles north of the town, the first two camps being in or near an arroyo. From more northern localities specimens are few, and I have seen none from the area between San Ignacio and the tip of the peninsula (the Cape region) where a dozen specimens were taken on October 18, 1941, by Ross and Bohart, at Agua Caliente,¹

¹ This series appears to have been mislabeled, judging by the specimens that I have seen of three other species (*anthracina*, *moerens*, and *subangulata*) alleged to have been collected at the same locality. The specimens of *missionaria* from Agua Caliente, as well as those of the other three species with the same data, were probably collected farther north in Baja California.

along with three males of *subangulata*. Although *australis*, a very similar species endemic to Baja California, was collected at nearby places in the Cape area (San Bartolo, San Pedro, El Triunfo, and others), as well as farther north in the southern district, the two species have not as yet been found together. Possibly *missionaria* is conspecific with *australis*, but in the large series of specimens of both forms examined, the character of the hairy tarsal pads of the males is constant, and the hairs are evidently sufficiently strong not to be affected by wear. All the males of *missionaria* (front and middle legs without hairy pads) have the eyes smaller and the clypeus more rounded (not or scarcely emarginate) than the males of *australis* (all legs with bristly pads). The genitalia of some males differ as shown in figures 205 and 206 (those of *missionaria* appearing more elongate and less widened apically), but these differences are not clear cut and there is much variation. Females of the two species are not always separable, except after many specimens have been checked, because the diagnostic characters are so few. In the present material, however, females are distinctly in the minority in both the species, so that identification has been facilitated.

The variation of *subangulata* (Canada to the Cape of Baja California) is of such a nature that some females of *missionaria* might be confused with females of that species (in some specimens of *subangulata* the head is less tumid than usual; in some the sides of the pronotum are not quite so angulate; in a few the second interval of the elytra has a double, instead of a single, row of punctures). Some specimens of *missionaria* vary also and approach individuals of *subangulata* by having the head slightly tumid, the sides of the pronotum more angulate, and even by having the elytra with a somewhat single row of punctures on the second interval. Both species occur together in various places in Baja California and in Jacumba and the Santa Rosa Mountains in San Diego County in southern California, but *missionaria* does not continue any farther north. The male genitalia of the two species are distinct.

Some specimens of *missionaria* might be confused with *fimbriata* (California and Baja

California), but that species differs by having medially toothed claws and only one row of punctures in the second elytral interval.

***Diplotaxis anthracina* Fall**

Figures 44, 97, 98, 150

Diplotaxis anthracina FALL, 1909, p. 71, pl. 1, fig. 13 (Santa Rosa, Baja California, Mexico; type, female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: The large front inner claw of the male (fig. 98) is unique in the genus. Also characteristic are the long, scarcely transverse, straight-sided pronotum and the very wide clypeus with the front margin much longer than either side margin.

RANGE: Baja California from the Cape region in the south as far north as Punta Prieta in the northern territory of the peninsula (fig. 44). A total of 82 specimens has been examined (see Appendix).

DESCRIPTION: Length, 8.5 to 13 mm. Color black, a few specimens dark red. Head as in *planidens*, except some specimens have a slight transverse tumidity instead of concentrated punctures (the type has two large depressions between the eyes). Clypeus as in *planidens*, except front margin is distinctly longer than either side margin, not same length, and angles in a few specimens more prominent and more reflexed; surface in a few slightly tumid at sides. Eyes not sunk, each eye about one-fifth of the width of head. Antennae, palpi, and mandibles as in *planidens*. Labrum about same length as, or slightly longer than, and advanced from under side of, clypeus, surface flat or slightly convex, finely and densely punctured, front margin arcuate. Mentum as in *planidens*, but declivity more advanced and rear edge more strongly margined.

Pronotum rather flat, punctures of disc in most specimens about same size as, but much sparser than, those on head, sides widest at middle, but sides scarcely arcuate, angles obtuse and not impressed, hind angles sharp. Elytra as in *planidens*, except marginal hairs as long at middle as scutellum. Metasternum, hind coxal plate, pygidium, propygidium, legs, and claws (but not claws of males) as in *planidens*, except punctures of pygidium rather sparse. Male genitalia about as in fig-

ure 150 of *parpolita*, but larger; basal piece as long as or longer than lobes.

SEXUAL DIMORPHISM: Males have the inner claw of the front tarsi nearly twice as large as the outer claw and the ungual tooth situated near the base of the claw (fig. 98); they have the teeth of both middle claws nearly obliterated and more or less fused with the claw, the base of the outer claw in some specimens rather enlarged; they have the inner margins of the hind tibiae and of the middle tibiae (near apex), also the first two segments of all the tarsi (ventrally) thickly fringed with long yellow hairs. The tarsi have not, however, true hairy pads. Females have the claws (fig. 97) and hairs normal and the fifth abdominal segment as long as the fourth, the pygidium less transverse than in males, the hind femora wider.

REMARKS: Fall, because his type and only specimen was a female, was of course unaware of the striking male character of this species, i.e., the unequal front claws, the inner one being twice the size of the outer and having a much larger and more basal tooth. Fall considered (1909, p. 71) "the form of the prothorax the most striking characteristic of this species," but his *atlantis* (central and eastern United States) has a quite similar pronotum, not markedly transverse and with the sides scarcely curved. The latter species (*brevicollis* group) differs from *anthracina* by having a concave, not flat, labrum, very large mandibles, short marginal hairs, and a distinct furrow on the under side of the clypeus.

In addition to secondary sexual characters, *anthracina* differs further from *punctulata*, also an endemic species in Baja California, in its smaller size, non-punctulate elytra, smaller mandibles, punctate hind femora, and larger, coarser, and less dense punctuation of the pygidium. The very broad-lobed genitalia of the male are similar to those of two species of the *trapezifera* group (*parpolita* from Baja California and *tehuana* from Oaxaca), the lobes being joined on the inner side even more basally than in *parpolita*, not so far front as in *tehuana*.

A very slight difference in the apices of the genitalia and in the shape of the clypeus exists between the majority of specimens from El Refugio southward and between nine spec-

imens from San Miguel northward. In the latter group (which includes also three of the largest specimens), the front of the clypeus is weakly emarginate and the front angles are somewhat prominent, and the apices of the genitalia are somewhat less acuminate, whereas the more southern individuals all have the clypeus truncate in front and uniformly rounded to the sides. All other characters are apparently the same, and it is a question whether this population is distinct enough to warrant a name. The differences are no greater than those found between *impressifrons* and *haydenii*, and I have synonymized the former with the latter.

This species does not have much affinity to the others of the group, except for the male characters of the hairy tarsi and the dissimilar claws, and the long pronotum.

SPECIES GROUP MAURA

Diplotaxis maura Fall

Figures 208, 209

Diplotaxis maura FALL, 1909, p. 72, pl. 1, figs. 38, 40 (Texas; type, female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: This robust species resembles a large *thoracica* or *trementina* (*frondicola* group), but differs from them by having the front margin of the clypeus distinctly emarginate, not rounded, the labrum very long, large, semicircular, and concave, and the punctures near the apex and on the sides of the elytra with scattered dorsal hairs (not always visible). No other species has quite the same labrum or male genitalia (figs. 208, 209).

RANGE: Southern New Mexico, western, central, and southern Texas, south to Villagrán in the state of Tamaulipas, northeastern Mexico. A total of 69 specimens has been examined (see Appendix).

HABITAT: A series of two males and five females were found "feeding on *Cephalanthus occidentalis*" (button-bush) by L. J. Bottimer, in Kerrville, Texas, on July 22, 1956, along with one specimen each of *thoracica* and *texana*.

DESCRIPTION: Length, 8 to 9.5 mm. Color dark red to black. Head rather convex in front in some specimens, descending obliquely to clypeal suture which is straight and visibly

impressed in most specimens, head and clypeus equally finely and densely punctured. Clypeus one-half or slightly less than one-half of length of head, front margin weakly reflexed, strongly emarginate and sinuate between broadly rounded angles, sides straight or somewhat emarginate, canthi strongly angulate over eyes. Eyes sunk, each eye about one-fifth of width of head. Antennae 10-segmented. Mandibles not large, shorter than labrum. Maxillary palpi without impression on last segment. Labrum not more than twice wider than long, strongly concave, finely and shallowly punctured, front margin exceedingly arcuate (a perfect semicircle), labrum from twice to two and one-half times as long as, and not advanced from, the reflexed under side of clypeus. Mentum strongly declivous, anterior declivity long (about one-half of mentum), its posterior margin rather straight, margined, and pubescent.

Pronotum large and convex, distinctly longer than length of head and clypeus combined, punctures of disc almost as dense as those of head but of same size, center with longitudinal impunctate space of varying length, sides widest behind middle, only gently arcuate to obtuse hind angles and right-angled front angles; base indistinctly depressed in some specimens. Scutellum densely punctured. Elytra about three times longer than pronotum, punctures slightly larger and distinctly sparser; second interval multipunctate; costae rather flat, with somewhat smaller punctures; marginal hairs about as long as width of a sutural interval; some apical punctures of costae and intervals with short hairs in some specimens; reflexed elytral margins narrowing to apex. Metasternum between coxae from one and one-half times to twice as long as second abdominal segment. Hind coxal plate angulate at sides, the angle extending onto the elytral margin. Pygidium with large, shallow punctures that are either sparse or dense. Propygidium grooved, spiracles not prominent.

Front tibiae with teeth shallowly cut, two apical teeth very close together and third tooth well in front of middle. Hind femora not wider than second abdominal segment is long. Middle tarsi with first segment longer than second, hind tarsi with first two segments about equal in length, hind tarsi as long as

hind tibiae. Hind tibiae with setose carinae weak. Claws bent abruptly and cleft subapically, tooth as long as and wider than claw. Male genitalia as in figures 208 and 209; basal piece longer than lobes.

SEXUAL DIMORPHISM: Males have narrower hind femora and hind tibial spurs than do females, and no apical flare to the hind tibiae (females have a marked widening at apex). The fifth abdominal segment is shorter in males and the first segment of the hind tarsi is as long as the longer spur, not shorter as in females. Males have a more transverse pygidium, but this is not a very reliable distinction in this species.

REMARKS: This species might be considered with the *marginicollis* group, but the species of that group have the front edge of the labrum nearly straight, not semicircular, and most of them (except *conformis* and *pygidialis*) have the surface of the labrum peppered with deep punctures. Although some individuals of *maura* have the labrum a little less rounded in front or less long and deep than in a typical specimen, the contrast of the long labrum with the very short under side of the clypeus is always marked, and a typical labrum is diagnostic of the species.

In addition to the characters given in the diagnosis, this species differs from *trementina* by having many punctures in the second elytral interval, not merely one row of punctures, deeply sunk eyes, the pronotum very densely punctured, and the front tibiae with a different arrangement of the outer teeth. *Diplotaxis trementina* occurs also in Texas, but less commonly.

The costal and other dorsal hairs at the apex and sides of the elytra, not mentioned by Fall, are as long, in some specimens, as one-half of the length of the marginal hairs. The lobes of the male genitalia are very thick and rather sinuous when viewed in profile (fig. 209), and the basal piece is very long.

A female from Villagran in Tamaulipas, Mexico, agrees with the more northern specimens except for the finer and sparser punctuation of the pronotum.

SPECIES GROUP *MARGINICOLLIS*

The following six species are placed in this group: *Diplotaxis marginicollis* Fall; *ingenue*

Fall; *rosae* Vaurie and Cazier; *decima* Vaurie and Cazier; *pygidialis*, new species; and *conformis* Fall.

These rather small species, although considered glabrous, actually have minute dorsal hairs emerging from the punctures. With the exception of *conformis* and *decima*, each species has different male genitalia, but all the species agree in having large bulbous mandibles and about the same head, eyes, antennae (club shorter, however, in *conformis*), elytra, metasternum, hind coxal plate, and legs. The front of the clypeus is emarginate between rounded angles except for *pygidialis* and *conformis* which have it scarcely emarginate or virtually truncate. The claws are subapically cleft and bent, with the exceptions of the same two species.

The species are characterized by having the front edge of the labrum not arcuate, but nearly straight, level with or sunk below the under side of the clypeus, the labrum itself as long at the sides as at the middle, much wider than long, and distinctly concave from side to side. It is either densely and coarsely punctured and much longer at the center than the under side of the clypeus (four species), or scarcely punctured and about the same length at the center as the under side of the clypeus (two species). Although the under side of the clypeus is too short to have any furrow in the first four species, there is a very faint furrow present in a few specimens of the last two species (*pygidialis* and *conformis*) which might cause them to be mistakenly placed in the *brevicollis* group (the labrum, however, is on a level with the under side of the clypeus, not advanced from it as in the *brevicollis* group). The concave labrum resembles that present in the small species of the *hebes* group, especially *contracta* and *cribratella* (members of this group have only nine segments in the antennae), and also that present in *catarinas* and *glabrimargo* of the *trapezifera* group, species with the clypeus hairy on the disc and its front margin usually bi-angulate or dentiform. Species of the *frondicola* group differ by having the clypeus rounded from side to side.

Approximately 2740 specimens have been examined (about 2200 of which are of the species *marginicollis* and *ingenue*), as well as the types of all the forms except of *futilis* Fall. In the formal descriptions, each species is com-

pared with the first one (*marginicollis*). Habitat notes are given for only two of the species (*pygidialis* and *conformis*).

DISTRIBUTION OF THE SPECIES

Three of the species are restricted to northwestern Mexico (*rosae*, *decima*, and *pygidialis*), and one is to the western United States (*conformis*); the other two (*marginicollis* and *ingenua*) occur in the southwestern United States and in northwestern Mexico.

KEY TO THE SPECIES OF THE *marginicollis* GROUP

1. Labrum covered with dense rugose punctures and decidedly longer than reflexed under side of clypeus; tarsal claws bent abruptly, tooth as long as and contiguous with apex of claw (fig. 7); clypeal margin usually distinctly emarginate 2
 Labrum faintly and sparingly punctured, if at all, and of about same length as under side of clypeus; claws gently curved, tooth shorter than and well separated from apex of claw (figs. 5, 6); clypeal margin usually virtually truncate 5
2. Pronotum with front and hind angles distinctly impressed and sides nearly straight, scarcely arcuate; mentum with apical declivity as long as one-half of mentum, and concave from side to side; northwestern Mexico *decima*
 Pronotum with angles either not at all impressed (*rosae*) or only front angles feebly impressed; mentum with declivity very short (in about apical fourth or fifth), its surface usually flat; northwestern Mexico and/or southwestern United States 3
3. Pronotum across base transversely depressed and/or impunctate; propygidium above pygidium without groove but with double or triple lines of punctures; northwestern Mexico *rosae*
 Pronotum punctured at base as well as elsewhere and base not depressed; propygidium with broad transverse groove; northwestern Mexico and southwestern United States 4
4. Pronotum along side margin near base longitudinally feebly depressed; pygidium densely punctured; usually larger and darker; male genitalia (fig. 225) elongate, lobes constricted and bulbous at apex; Arizona, New Mexico; Chihuahua, Mexico *marginicollis*
 Pronotum not depressed along sides at base; pygidium usually sparsely punctured; usually smaller and tawny-colored; male genitalia (fig. 193) short, lobes not constricted or bulbous; Arizona; Sonora, Chihuahua, Durango, Mexico *ingenua*

5. Marginal hairs of elytra as long as scutellum; sides of pronotum strongly subangulate and front angles not acute or drawn forward; mentum scarcely declivous in front, edge of declivity rounded off, not noticeable; southwestern United States, including southeastern California *conformis*
 Marginal hairs of elytra no longer than width of a sutural interval; sides of pronotum arcuate, front angles rather acute and drawn forward; mentum declivous in front, edge of declivity sharp, prominent; Durango, Mexico *pygidialis*

Diploptaxis marginicollis Fall

Figure 225

Diploptaxis marginicollis FALL, 1909, p. 67, pl. 1, fig. 35 (Huachuca Mountains, Arizona; type, female, from Fort Huachuca, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Although some individuals are difficult to distinguish from some *ingenua* (very similar head, clypeus, labrum, and mentum in both), the male genitalia are entirely different. Generally, *marginicollis* differs further by having the sides of the pronotum uniformly arcuate (not sinuate before acute, rather forward-drawn front angles as in *ingenua*) and slightly impressed posteriorly, the front margin of the pronotum also impressed at sides, the epipleurae of the elytra not markedly widening or "swirling" before apex as in most *ingenua*, and the clypeus usually longer. The pronotum resembles that of *pygidialis* from northern Mexico, but the claws, labrum, and genitalia differ.

RANGE: All of Arizona and parts of New Mexico south into Chihuahua in northern Mexico, mostly in the mountains. A female has been examined from Douglas County in northeastern Kansas (collected by B. M. Marlatt) and another from Medina County in eastern Texas (collected by K. Stager), localities which I question for this species. More than 1000 specimens have been examined (see Appendix).

DESCRIPTION: Length, 7 to 10.5 mm. Color dark red to black, red specimens often with head black. Dorsum with very minute hairs emerging from punctures. Head flat in front, descending obliquely to clypeus without interruption at clypeal suture, the latter obliterated at middle in most specimens, head finely and rather densely punctured. Clypeus

with a few hairs at front in some specimens, one-half or less of the length of head, punctures denser than those on head in most specimens, front border margined but not truly reflexed, scarcely or slightly emarginate between broadly rounded angles, sides slightly sinuate, canthi angulate in some specimens. Eyes not sunk, each eye about one-fifth or one-sixth of the width of head. Antennae 10-segmented, club about as long as funicle. Mandibles large (as long as labrum). Maxillary palpi with last segment impressed or at least flattened basally. Labrum at least three times wider than long, concave at center, densely punctured and rugose, sides prominently advanced, front margin virtually straight, labrum about one and one-half or two times longer than, and level with or sunk below, the under side of clypeus. Mentum rather flat, but with short declivity in apical fourth or fifth delimited by margined and pubescent, nearly straight, rear edge.

Pronotum with punctures of disc sparser than those of head, but of same size, center in many specimens with longitudinal impunctate space, sides widest a little behind middle, strongly arcuate to obtuse hind angles and to rectangular or slightly acute front angles that are somewhat impressed within, sides slightly impressed along margin posteriorly, an apical submarginal impressed line (actually composed of a line of punctures) present in many specimens as well as an impunctate marginal band in front. Scutellum virtually impunctate. Elytra about three times longer than pronotum, punctures of about same size and sparseness; second interval multipunctate; costae convex, with row of smaller punctures; marginal hairs not longer than width of a sutural interval; reflexed margins slightly wider in some specimens before apex than in region of hind coxal plate. Metasternum nearly twice as long as second abdominal segment. Hind coxal plate very slightly angulate at sides (often worn), the angles extending onto epipleurae. Pygidium with fine and dense punctures. Propygidium grooved or variable, spiracles not prominent.

Front tibiae with teeth shallowly cut, two apical teeth close together, third tooth well in front of middle. Hind femora not (or scarcely, in female) wider than second abdominal segment is long. Middle tarsi with first segment longer than second, hind tarsi with first

slightly shorter, hind tarsi as long as hind tibiae. Hind tibiae with setose carinae sparse, extending across face of tibiae. Claws bent abruptly and cleft subapically, tooth as long as and wider than claw. Male genitalia as in figure 225 of *parvicollis*, but even more curved in profile; basal piece of about same length as lobes.

SEXUAL DIMORPHISM: Males have narrower, more parallel-sided hind femora and narrower hind tibial spurs than do females, and less apical flare to the hind tibiae (in females the corbel is almost twice wider than the tibiae at middle). The fifth abdominal segment is shorter in males. The first segment of the hind tarsi is as long as the longer of the spurs, not shorter as in females. Males have a more transverse pygidium.

REMARKS: This species and *ingenuea* (which follows) are exceedingly abundant throughout the state of Arizona, coming to lights in great numbers. Only two specimens of *marginicollis*, however, have been seen from northern Mexico (near Primavera, Chihuahua), whereas 80 specimens of *ingenuea* have been seen from Chihuahua and northern Durango. The majority of *marginicollis* are larger and darker than most specimens of *ingenuea*, but there is some variation in these characters, as there is also in the epipleurae of the elytra, and in the front angles and subapical impression of the pronotum. In both species a few specimens have the reflexed elytral margins narrowed to the apex, but most specimens have them slightly wider at the apex than at the middle; no specimens of *marginicollis*, however, have been seen with the wide apical "swirl" present in most *ingenuea*. Of the two species, *ingenuea* is the more variable.

Diplotaxis ingenuea Fall

Figure 193

Diplotaxis ingenuea FALL, 1909, p. 35, pl. 1, figs. 32, 34 (Huachuca Mountains, Arizona; type, male, in the Museum of Comparative Zoölogy).

Diplotaxis rufocastanea MOSER, 1918, p. 308, "Mexico"; type, male, in the Zoologisches Museum, Berlin).

Diplotaxis fusca MOSER, 1918, p. 312 ("Mexico"); type, female, in the Zoologisches Museum, Berlin).

Diplotaxis futilis FALL, 1932, p. 194 (Nogales, Arizona; type not found in Fall collection at Museum of Comparative Zoölogy).

DIAGNOSIS: Very similar to *marginicollis* and *pygidialis*, but generally smaller than either, differing further from the former, as stated in the diagnosis of that species, and from *pygidialis* in the rugosely and densely punctured and more sunken labrum, the apically, not submedially, cleft claws, and the flat, not advanced, mental declivity. The "swirl" of the reflexed margin of the elytra, when present, is immediately diagnostic of *ingenua*.

RANGE: All Arizona, mainly in the mountains, and south into the northwestern Mexican states of Sonora, Chihuahua, and Durango. About 1200 specimens have been examined (see Appendix).

DESCRIPTION: Length, 6 to 9 mm. Color tawny. Dorsum, head, and clypeus as in *marginicollis*, except clypeal suture is impressed in most specimens and clypeus in most is only one-third of the length of head. Eyes, antennae, mandibles, labrum, and mentum as in *marginicollis*. Maxillary palpi with last segment flattened, not impressed. Pronotum as in *marginicollis*, except subapical impressed line is less marked, sides in most specimens are sinuate before front angles, the latter acute, and sides not depressed along margin posteriorly. Scutellum punctured in most specimens. Elytra as in *marginicollis*, but some specimens have second interval virtually unipunctate, and reflexed margins at apex are much wider in most, though not in all, specimens. Pygidium sparsely punctured. Metasternum, hind coxal plate, propygidium, legs, and claws as in *marginicollis*. Male genitalia as in figure 193 of *frondicola*, basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *marginicollis*.

REMARKS: Although more like *marginicollis* than any other species, *ingenua* resembles *rosae* (northern Mexico) also and occurs in some of the same localities (Catarinas, Huejotitlan, Matachic, Encino). These two species differ mainly in respect to the male genitalia (figs. 185, 193), in the pronotum (*ingenua* has sinuate sides and acute front angles and lacks the basal impressed line of *rosae*), pygidium (generally sparsely punctured in *ingenua*, always densely punctured in *rosae*), and propygidium (grooved in *ingenua*, not so in *rosae*). Differs from the rather similar *barbarae* (*atramentaria* group)

mainly by having the labrum sunken, concave, and densely punctured, not flat in front and scarcely punctured, and in the more densely punctured elytral costae.

The synonymy was explained recently by Vaurie (1954, p. 50).

The majority of the 1200 specimens were collected in Carr Canyon in the Huachuca Mountains and in Madera Canyon in the Santa Rita Mountains, Arizona.

An occasional specimen of *ingenua* has the clypeus worn, so that it seems rounded from side to side; such a one might be confused with *frondicola* from the eastern United States and Texas, but the eyes, labrum, mandibles, and elytra differ.

Diplotaxis rosae Vaurie and Cazier

Figures 185, 229

Diplotaxis rosae VAURIE AND CAZIER, 1955, p. 15, figs. 1, 2B, 3C (Salaices, Chihuahua, Mexico; type, male, in the American Museum of Natural History).

DIAGNOSIS: This species differs from others of the group by having the base of the pronotum transversely depressed and/or impunctate, and the propygidium without transverse groove.

RANGE: Northern Durango and all the state of Chihuahua. All specimens examined are those of the type series, numbering 277 (see Appendix).

DESCRIPTION: Length, 7 to 9 mm. Color dark red, often head and other parts black. Dorsum, head, and clypeus as in *marginicollis*, except for sides of clypeus which are not sinuate and canthi which are not angulate. Eyes, antennae, mandibles, palpi, labrum, and mentum as in *marginicollis*, except labrum not so concave. Pronotum transverse, punctures of disc much sparser than those of head, but of same size, center with various impunctate areas, sides widest behind middle, gently arcuate to obtuse hind angles and rectangular front angles, angles not at all impressed, but base transversely depressed and/or impunctate. Scutellum punctured. Elytra as in *marginicollis*, but punctures larger and denser than those on disc of pronotum and punctures of costae in many specimens almost as large as those of intervals; reflexed elytral margins narrow through-

out. Metasternum and hind coxal plate as in *marginicollis*. Pygidium with large, dense, rugose, or reticulate punctures. Propygidium not grooved, spiracles not prominent. Legs and claws as in *marginicollis*. Male genitalia as in *blanchardi* (fig. 185), except apices not at all widened, the side view as in figure 229; basal piece of about same length as lobes.

SEXUAL DIMORPHISM: As in *marginicollis*, but females have the hind femora as parallel-sided and nearly as narrow as males.

REMARKS: Although evidently common in northwestern Mexico as far north as Primavera and San Jose Babicora, Chihuahua, this species has not been taken in the United States, and no specimens have been seen by me since the original description (1955). Differences between it and *ingenua* are given under that species. *Diplotaxis rosae* differs markedly from the following species, *decima* (also northwestern Mexico), by having the angles of the pronotum neither impressed nor acute and the punctuation of the head and pronotum uniformly dense, not irregular and sparse.

The basally impressed pronotum, long, narrow, hind legs, the densely punctured large labrum, and the male genitalia (figs. 185, 229) recall some of the species of the *frondicola* group, especially *blanchardi* and *urbana*, but the clypeus in *rosae* is distinctly emarginate, not rounded from side to side, the eyes are smaller and placed farther apart, and the labrum is more concave.

Although in a previous paper (1955, p. 14) I discussed this species with *barbarae* and gave a number of ways in which they differed, I did not mention the two characters that now seem to me the most obvious ones for discrimination. These are that the labrum is not only concave in *rosae* (not flat), but that it is densely and coarsely punctured; and the costae of the elytra have large dense punctures in *rosae*, but are virtually impunctate, or at least have minute punctures, in *barbarae*.

***Diplotaxis decima* Vaurie and Cazier**

Figures 103, 222, 223

Diplotaxis decima VAURIE AND CAZIER, 1955, p. 10, figs. 1, 3C (Palos Colorados, Durango, Mexico; type, male, in the American Museum of Natural History).

DIAGNOSIS: Distinguished from all other species in the genus by a combination of the following characters: densely punctured, rather sunken, very long labrum (fig. 103), concave but declivous mentum, bulbous mandibles, impressed pronotal angles, strongly bisinuate clypeal margin, apically widened "swirled" epipleurae of the elytra, and bent, apically toothed claws.

RANGE: The northwestern states of Chihuahua and Durango, Mexico. A total of 45 specimens has been examined. *Chihuahua*: Santa Barbara, three; Matatic, one male. *Durango*: Palos Colorados, 41 (type and paratypes).

DESCRIPTION: Length, 8 to 10.5 mm. Color dark red to black. Dorsum, head, and clypeal suture as in *marginicollis*, but head sparsely punctured. Clypeus from one-third to one-fourth of the length of head, punctures denser than those on head, front margin strongly, broadly emarginate and scarcely reflexed between rounded angles, sides not sinuate, canthi not prominent. Eyes, antennae, mandibles, palpi, and labrum as in *marginicollis*, but labrum at least twice longer than under side of clypeus. Mentum with anterior declivity in about apical one-half, declivity slightly concave, margined, and pubescent. Pronotum transverse, even more sparsely punctured than head (in some specimens large impunctate areas present), sides widest at about middle, but scarcely arcuate in many specimens which have the sides at base nearly parallel; front and hind angles broadly or shallowly depressed within, front angles acute and drawn forward, hind angles obtuse. Scutellum punctured or not. Elytra as in *marginicollis*, except costae flat or convex and with tiny punctures, reflexed elytra margins (epipleurae) twice wider near apex than at middle. Metasternum, hind coxal plate, and pygidium as in *marginicollis*. Propygidium with groove, when present, indistinct, spiracles not prominent. Legs and claws as in *marginicollis*. Abdomen with part of first or second segment opaque and first segment tumid medially in some specimens. Male genitalia about as in *brevicollis* (figs. 222, 223); basal piece of about same length as lobes.

SEXUAL DIMORPHISM: As in *marginicollis*, except that the hind tibial spur is scarcely wider in females than in males.

REMARKS: From above, this species, because of the distinctly impressed pronotal angles and the strongly emarginate clypeus, has more the aspect of *parvicollis* and some other members of the *brevicollis* group than it does of this group. The labrum, however, is quite different from that of *parvicollis*, being much longer than the under side of the clypeus and the same length throughout, concave throughout, rugosely and densely punctured, the front margin nearly straight, and on a level with, or lower than, the under side of the clypeus. This is the largest species of the group and has the longest and widest labrum. As is *rosae*, this species is still known only from the type series. The elytra, including the epipleurae, and the legs, head, and clypeus are much as in the smaller *ingenua*, but the sides of the pronotum are straighter, not arcuate-sinuate, the pronotal angles are broadly impressed, and the mentum has a marked and concave declivity (in *ingenua* the mentum is virtually flat). A species (*subcostata*) from another group that occurs in the eastern United States bears some resemblance to *decima* (labrum, mandibles, sparse punctuation, pronotal angles), but it differs by having different tibiae, very large hind femora, sinuate pronotal sides, and the prosternal process bicarinate, not unicarinate.

***Diplotaxis pygidialis* Vaurie, new species**

Figures 210, 211

TYPE MATERIAL: Type, male, El Tascate, Durango, Mexico, July 28, 1947, David Rockefeller expedition, Spieth, collector, and nine paratopotypes (six males, three females), Spieth, Schrammel, and Cazier, collectors, in the American Museum of Natural History; also one male paratopotype in each of the following: Instituto de Biología, Mexico City; Rockefeller Foundation Agricultural Program, Mexico City; California Academy of Sciences; and the United States National Museum.

DIAGNOSIS: Differs from others of the group except *conformis* by having the tooth of the claws very small, placed nearer the middle of the claw than the apex and separated from the tip of the claw, the claws gently curved, not bent abruptly, by having the front margin of the clypeus less emar-

ginate, virtually truncate, and the labrum shorter and only sparsely, not densely, punctured. Differs from *conformis* in the male genitalia, by having the clypeus shorter, the labrum less indented, the declivity of the mentum more pronounced, the marginal hairs short, and the hind angles of the pronotum somewhat impressed.

RANGE: Northern part of the state of Durango in northwestern Mexico. Three additional females have been examined from Encino, less than 10 miles west of El Tascate, taken on July 27, 1947, also taken on the David Rockefeller expedition.

HABITAT: The specimens were collected "on Juniper" at night.

DESCRIPTION OF TYPE, MALE: Length, 9.5 mm. Color dark red. Dorsum and head as in *marginicollis*. Clypeal suture visibly impressed, slightly sinuate. Clypeus one-half of the length of head, punctures larger and denser than those on head, front margin shallowly reflexed, truncate between rounded angles, sides not sinuate, canthi not prominent. Eyes, antennae, and mandibles as in *marginicollis*. Maxillary palpi with last segment impressed. Labrum three times wider than long, concave at center, faintly punctured, front margin virtually straight, labrum no longer than reflexed under side of clypeus and, in repose, level with it, under side of clypeus with faint transverse furrow. Mentum with rather prominent declivity in apical third, its posterior edge sharp, not margined or pubescent, scarcely arcuate. Pronotum as in *marginicollis*, except no impunctate space, front angles more drawn forward and hind angles (not sides, however) broadly and shallowly impressed; apical impressed line absent. Scutellum with six punctures. Elytra as in *marginicollis*, except that punctures are a little larger than those on pronotum but about as sparse. Metasternum as in *marginicollis*, hind coxal plate more or less truncate at sides. Pygidium very large, rather flat, punctures sparse, surface rather opaque, apex with fringe of yellow fuzz of short hairs. Propygidium with groove feeble, spiracles not prominent. Legs as in *marginicollis*. Claws gently curved, tooth emerging at middle of claw, but its apex slightly in front of middle, tooth much shorter (minute) than apex of claw. Genitalia as in figures 210

and 211; basal piece distinctly longer than lobes.

SEXUAL DIMORPHISM: As in *marginicollis*.

VARIATIONS FROM TYPE: The length in all specimens varies from 8.5 to 10 mm. Some specimens differ from the type as follows: by having the clypeal suture straight, the head rather sparsely punctured, the clypeus only one-third of the length of the head and (in about half of the specimens) very slightly emarginate at middle, the canthi angulate, the labrum perhaps slightly longer than under side of clypeus, and the latter flat, the declivity of the mentum with its posterior edge convex (worn), scutellum impunctate (in more than half of the specimens), the hind coxal plate slightly angulate laterally, surface of pygidium shining (in two specimens).

REMARKS: The concentrated short yellow hairs at the apex of the pygidium in both sexes seem to emerge from the punctures of the dorsal surface, not from below as seems to be true of the few hairs present in *marginicollis* and some of the other species. The hairs are not so apparent in the type as they are in some of the paratypes. This would seem to be a good character, but, as other species also have some such hairs, it has not been used as a character in the key to the species.

Except for these pygidial hairs and for the much more robust male genitalia (figs. 210, 211), this species resembles others of the group in a number of characteristics. Thus it has the same kind of labrum, claws, and front clypeal margin as *conformis*, hind pronotal angles as in *decima* (though not so strongly impressed as in *decima*), and the general aspect of *ingenuea* and *marginicollis*.

At the same time and place and also on the same tree (juniper) were collected a long series (50 specimens) of what appears to be *completa* (*brevicollis* group), a species that occurs also in Texas and northern Coahuila as well as at El Tascate and Encino. This species differs from *pygidialis* principally by having the under side of the clypeus distinctly furrowed, and it usually has the front of the head slightly transversely tumid. Also at El Tascate and Encino, four specimens of *barbarae* were taken, a species that differs by having distinctly apically cleft and strongly bent claws, larger eyes, smaller mandibles, and the head and clypeus uniformly and

densely punctured. At Encino, on the same date, *ingenuea* and some of the paratypes of *rosae* were collected. These species differ from *pygidialis* in the claws, male genitalia, and punctuation of the labrum, as well as by having (*rosae*) a transverse depression at the base of the pronotum and (*ingenuea*) by having the mentum flat.

Both *pygidialis* and *conformis* have a faint furrow on the under side of the clypeus in some individuals, so that they might be considered to belong with the *brevicollis-haydenii* group or the *punctulata* group. (See also remarks under *conformis*.)

Diplotaxis conformis Fall

Figures 222, 223

Diplotaxis conformis FALL, 1909, p. 34, pl. 1, fig. 14 ("Glenwood Springs, Colorado . . . Prescott and Bright Angel, Arizona"; the type, a female, is from Prescott, Arizona, in the Museum of Comparative Zoölogy).

DIAGNOSIS: The short, scarcely punctate, distinctly indented, shallowly V-shaped, very wide labrum, with the barely convex, non-declivous mentum, long, trapezoidal clypeus, and long marginal hairs, makes this species, once recognized, readily identifiable again. The mandibles are longer than the labrum. The long marginal hairs distinguish *conformis* from others of the group; the labrum distinguishes it from all except *pygidialis* (see diagnosis of that species).

RANGE: Southwestern United States from Colorado and New Mexico west to southeastern California, Nevada, and southern Oregon. A total of about 200 specimens has been examined (see Appendix).

HABITAT: Two males and a female were collected in pinyon pine and juniper forest at Panaca, Nevada, August, 1955, by Robert F. Koontz, and quite a few specimens from New Mexico (C. Clayton Hoff collection) were taken in the sweeping of junipers at night or in juniper litter from a Berlese funnel.

DESCRIPTION: Length, 8 to 9.5 mm. Color dark red or black. Dorsum, head, and clypeal suture as in *marginicollis*, but surface of head in front in some specimens with slight flattening or with a vague circular impression, and punctuation of head variable. Clypeus nearly trapezoidal, one-half or more of length of

head, punctures denser and larger than those of head in most specimens, front margin either truncate between rounded angles or slightly emarginate at middle, margin broadly and evenly reflexed throughout, or reflexed more strongly behind angles, sides not sinuate, canthi not angulate, except in a few specimens. Eyes, antennae, mandibles, and palpi as in *marginicollis*, except antennal club is shorter. Labrum at least three times wider than long, virtually impunctate, deeply concave from side to side and also from front to rear but not so deeply as to be called cleft, sides prominent, front margin nearly straight, labrum no longer than and level with under side of clypeus, which is weakly furrowed. Mentum slightly convex throughout, without distinct declivity, although a very short one is visible in some specimens. Pronotum with punctures fine or coarse, but sparse; sides widest slightly behind middle, thence strongly cut back to obtuse hind angles and to obtuse or slightly acute front angles, angles not impressed. Scutellum punctured or not. Elytra, metasternum, and hind coxal plate as in *marginicollis*, except for marginal hairs of elytra that are as long as or longer than scutellum. Pygidium sparsely or densely punctured. Propygidium grooved, spiracles not prominent. Legs as in *marginicollis* except for setose carinae of hind tibiae that are restricted to outer edge only. Claws gently curved, tooth with apex slightly in front of middle, but distant from and shorter than apex of claw. Male genitalia about as in *brevicollis* (figs. 222, 223), but much smaller and basal piece longer than lobes.

SEXUAL DIMORPHISM: As given for *marginicollis*, except flare of hind tibiae in female not so wide.

REMARKS: This species, although variable in a number of characters (the shape and degree of reflection or emargination of the clypeus, the punctuation of the clypeus, head, pronotum, and pygidium), is nonetheless always recognizable, as stated in the diagnosis above. In contrast to others of the group, except *pygidialis*, *conformis* has the front and side margins of the clypeus of about the same length, not the front margin longer than either side margin.

A few specimens have a very weak transverse furrow on the under side of the clypeus,

a fact that might cause this species to be considered one of the *brevicollis* group, and it does seem to have some relation to *mentalis* of that group, but the furrow in *conformis* is not at all distinct; in addition the labrum is not advanced from the under side of the clypeus. Fall (1909, p. 34) considered *conformis* "very similar to" *mentalis*.

SPECIES GROUP *TRUNCATULA*

The following species are included in this group: *Diplotaxis truncatula* LeConte; *arctifrons* Bates; *atrata* LeConte; *levicosta* Fall; *punctata* LeConte; and *pumila* Fall.

Approximately 1600 specimens have been examined (the majority of which are of *truncatula* and *arctifrons*), as well as the types of all the described forms.

These six species are distinguished from others of the genus by a combination of two characters: the strongly elevated continuous ridge or carina on the sides of the abdomen just underneath the elytral margin (fig. 3), the carina reaching almost to or even beyond the posterior spiracle, and the virtually impunctate costae of the elytra (fig. 1). There are other species with the costae impunctate (*atramentaria* group), and 15 others with the abdomen ridged, but these six are the only species combining both characters. Although the species of this group seem closely related and have the abdomen ridged, the other species with a ridged abdomen, all but three of which are dorsally hairy, do not all seem to be related, and they occur in seven different groups.

The species of the *truncatula* group are characterized further by having the first segment of the middle tarsi distinctly longer than the second, the eyes widely spaced, the pronotum, at least in some specimens of all the species, with the front angles acute (a variable character in this group), the claws cleft subapically, the hind tibiae strongly carinate and with the apex widened rather strongly in both sexes. The genitalia of the male are quite similar, all having the lobes joined near the base (in basal third, fourth, or fifth), the differences in shape being very slight (except in the case of *pumila*) and tending to merge.

With the exception of Fall in his revision (1909), none of the authors of the described

forms mentions the ridged abdomen, and even Fall does not mention it for either his *acerba* (synonym of *punctata* LeConte), or *pumila* or for *atrata* LeConte. He evidently considered most of the species of this group similar, because he places them close to one another in his classification, except that "*acerba*" is between *rufiola* and *ingenua*, and *atrata* is near *subangulata*.

"The almost complete absence of the serial punctures of the elytral costae except near apex," noticed by Fall for *levicosta* (1909, p. 88) and *atrata* are also not mentioned by the other authors (Bates, Casey, Cazier, LeConte). In some individuals a few scattered punctures are present on one or two of the discal costae, but none of the species has dense or regular punctures, as occur in the majority of species of the genus.

This group is superficially similar to *carbonata* and *subangulata* of the *frondicola* group, also to the *trapezifera* group (hairy clypeus, glabrous dorsum). One of the species (*pumila*) has the hairy clypeus of the latter group, and a similar kind of male genitalia as do some of the *trapezifera* species.

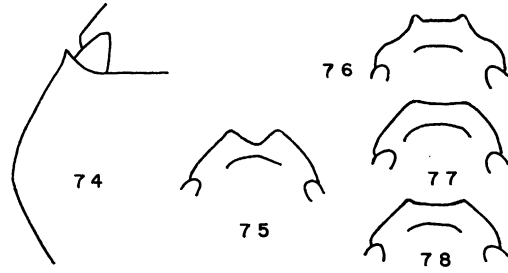
The only notes available on habitat are for *truncatula* and *punctata*.

CHARACTERS OF THE *truncatula* GROUP

The species are small to medium in size (4.5 to 8.5 mm.), black or dark red, a few specimens light brown. The following characters common to all the species are not necessarily repeated in the descriptions.

Clypeal suture variable within the species. Clypeus not hairy (except in *pumila*). Eyes somewhat sunk, each eye from one-fifth to one-sixth of the width of the head. Antennae 10-segmented. Maxillary palpi with last segment not impressed, but it may be slightly flattened. Scutellum variable within the species in the density of punctuation. Elytral sutural intervals with single, but often irregular, row of punctures. Abdomen ridged laterally, fifth segment grooved above pygidium in most species. Middle tarsi with first segment distinctly longer than second. Hind tarsi with first two segments about equal in length, hind tarsi not longer than hind tibiae. Subapical setose carinae of hind tibiae distinct, usually extending across face of tibiae.

SEXUAL DIMORPHISM: See *truncatula*.



FIGS. 74-78. Body parts in *truncatula* group of *Diplotaxis*. 74. *D. pumila*, pronotal sides. 75. *D. levicosta*. 76. *D. arctifrons*. 77. *D. atrata*. 78. *D. truncatula*.

DISTRIBUTION OF THE SPECIES

All but one of the species (*arctifrons*) occur in the southwestern part of the United States (but not California), and all but one (*pumila*) in Mexico. The most northern record is for *punctata* (Nevada), and the most southern is for *arctifrons* and *truncatula* (Hidalgo).

KEY TO THE SPECIES OF THE *truncatula* GROUP

1. Clypeus sparsely hairy; length, 4.5 to 5.5 mm.; Arizona, possibly New Mexico, but not Mexico; male genitalia pincer-like, lobes joined on inner side at basal third (fig. 123) *pumila*
- Clypeus without hairs; length, generally over 5 mm.; Mexico and southwestern United States, rare in Arizona; male genitalia not of pincer type, lobes joined on inner side at basal fourth or fifth (figs. 79-86) 2
2. Marginal hairs at middle of elytra shorter than width of one sutural interval; labrum rather flat; front margin of clypeus usually semicircular, but may be slightly hemihexagonal *punctata*
- Marginal hairs at middle of elytra (unless worn) longer than width of a sutural interval, often as long as scutellum; labrum concave, the sides prominent; front margin of clypeus not semicircular 3
3. Hind coxal plate with the sides truncate or rounded (fig. 4), seldom fitting over the edge of the elytral margin 4
- Hind coxal plate with the sides angulate or knobbed in front (fig. 4), the projection extending over the elytral margin 5
4. Second elytral interval crowded with punctures; size 6 to 8.5 mm.; lobes of male genitalia knobbed or bulbous at apex (figs. 81, 82) *truncatula*
- Second elytral interval with a single row (in some specimens irregular) of punctures be-

- tween the stria punctures; size 4.5 to 5.5 mm.; lobes of male genitalia not knobbed at apex (figs. 85, 86) *atratura* in part
5. Clypeus deeply emarginate in front between prominent triangular angles (fig. 75); male genitalia elongate, lobes curved downward near middle (figs. 79, 80) *levicosta*
- Clypeus not or scarcely emarginate in front; male genitalia with lobes much shorter than those of *levicosta* and not curved down at middle 6
6. Front of head flat or convex, not ridged; clypeus with front angles dentiform or projecting forward somewhat (unless worn), the front margin shorter than either side margin, side margins usually gently sinuate (fig. 76); 6.5 to 8.5 mm.; male genitalia seen in profile with lobes straight (fig. 84); not in the United States *arctifrons*
- Front of head with tumid post-clypeal ridge; clypeus with front angles rounded off, usually not projecting at all, front margin appearing longer than either side margin, side margins not sinuate (fig. 77); 5.5 to 7 mm.; male genitalia in profile with lobes sinuous (fig. 85); United States and northern Mexico *atratura* in part

Diplotaxis truncatula LeConte

Figures 78, 81, 82

Diplotaxis truncatula LECONTE, 1856, p. 269 (Kansas; type in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 51 (clypeus).

Diplotaxis consors LECONTE, 1856, p. 269 (Texas; type in the Museum of Comparative Zoölogy).

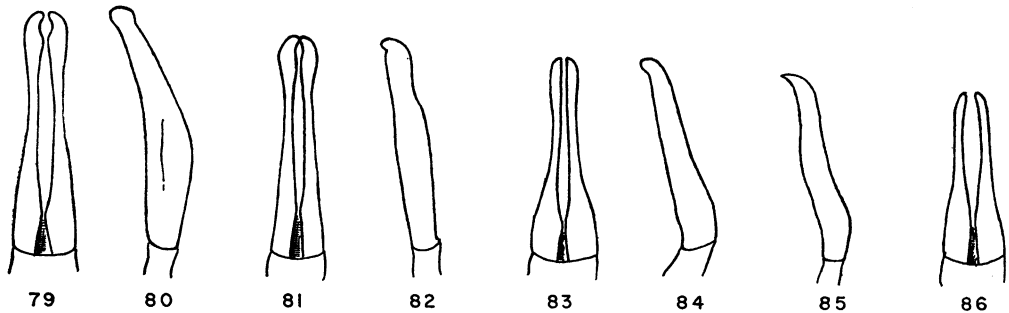
Diplotaxis morula LECONTE, 1856, p. 270 (Kansas; type in the Museum of Comparative Zoölogy).

DIAGNOSIS: Differs from the other species of the group by having knobbed apices on the lobes of the male genitalia, the apices being as wide as the base of the lobes, and in having occasional punctures on the elytral costae. Resembles most closely *arctifrons* Bates, from which it differs by having the sides of the clypeus straight, not sinuate (figs. 76, 78) and the sides of the hind coxal plate truncate or rounded, even subangulate in a few specimens, but not angularly projecting onto the elytral margin (fig. 4).

RANGE: From Kansas and Colorado south, including southeastern Arizona, into Mexico as far as the states of Durango in the west and Hidalgo in the east. One specimen has been examined from "Cal.," without further data, but this requires verification. Approximately 600 specimens have been examined. (See Appendix for further data.)

HABITAT: A series of three specimens from Zimapan, Hidalgo, were collected on the fragrant flowers of *Eysenhardtia polystachya* by Paul D. Hurd, Jr., in June of 1951. Many specimens were taken in a light trap from March to May, 1958, by Jean Mathieu at the experimental station, "Campo Apodaca," near Monterrey, Nuevo Leon, Mexico. H. and A. Howden collected a specimen on *Acacia* 2 miles west of Fort Davis, Texas, July 14, 1956.

DESCRIPTION: (See also characters of group). Length, 6 to 8.5 mm. Color tawny, dark red, or black. Head densely, rather confluent punctured, a slight ridge or frown present behind clypeus and often a transverse



FIGS. 79-86. Lateral lobes of male genitalia of *truncatula* group of *Diplotaxis*. Views are dorsal unless otherwise stated. 79. *D. levicosta*. 80. *D. levicosta*, profile. 81. *D. truncatula*. 82. *D. truncatula*, profile. 83. *D. punctata*; characteristic also of *D. trementina* (*frondicola* group). 84. *D. punctata*, profile; characteristic also of *D. trementina* and *D. arctifrons*. 85. *D. atratura*, profile. 86. *D. arctifrons*; characteristic also of *D. atratura*.

impunctate space. Clypeus about one-half of the length of head, punctures as dense as those on head, front margin truncate or slightly emarginate and scarcely reflexed between obtuse or dentiform angles, sides oblique, not or scarcely sinuate. Labrum flat in front, slightly concave behind, same length as and level with reflexed under side of clypeus, faintly punctured. Mentum appearing flat, but with slight declivity in anterior fourth that is weakly ridged and pubescent.

Pronotum with punctures of disc of same size as those on head, but somewhat sparser, sides strongly arcuate and widest behind middle, front and hind angles obtuse, but front ones rather drawn forward, base depressed. Elytra almost three times longer than pronotum, punctures larger; second interval with two or three irregular rows of punctures; costae with only three or four or no punctures; marginal hairs at middle as long as scutellum. Metasternum at middle one and one-half times longer than width of hind femora. Hind coxal plate laterally truncate, not extending onto elytral margin. Abdominal ridge reaching as far as posterior spiracle, but very weak on sides of fifth segment in some specimens, fifth segment with deep transverse groove and ridge above pygidium in some but not in all specimens. Pygidium densely and in some specimens confluent punctured.

Front tibiae with third tooth slightly in front of middle. Hind femora as wide as length of second abdominal segment and emarginate before apex on inner side. Claws bent abruptly, cleft near apex, tooth close to claw. Male genitalia as in figures 81 and 82; basal piece slightly shorter than lobes.

SEXUAL DIMORPHISM: Males have the pygidium more transverse and more retracted, often markedly so, the fifth abdominal segment shorter than the fourth, the hind femora and tibial spurs narrower, and the hind first tarsal segment longer than do the females.

REMARKS: This species has a rather wide distribution for a *Diplotaxis* and is also (or consequently?) extremely variable, some of its variations approaching *arctifrons*. I have seen the types of LeConte's *morula* and *consors*, both of which were synonymized by Fall (1909, p. 86), and I agree with Fall that they are not distinct species, but individual vari-

ants of *truncatula*, one of them ("*consors*") having the front angles of the pronotum rather more drawn forward over the eyes. There are all gradations, however, in the shape and sharpness of these angles, as there are gradations also in the length and breadth of the pronotum and clypeus, in the intensity of the post-clypeal ridge or frown, and in the punctuation of the second interval of the elytra. The second interval, although generally distinctly multipunctate, is in some specimens (two, at least, from The Basin, Big Bend National Park, Brewster County, Texas) irregularly unipunctate in the front, half. Occasional specimens throughout the range have one or two or more punctures on the elytral costae which are impunctate in most specimens. The lateral margin of the hind coxal plate is slightly angulate in front in a few individuals, but it never juts out over the edge of the elytral margin as in the other species of the group. Even the genitalia of the male (figs. 81, 82) are slightly variable, but the lobes in the many dissected specimens from various localities are always knobbed apically, not straight as in *arctifrons* (fig. 86). The pronotum of *truncatula*, as mentioned by Fall (1909, p. 86) in his comparison of this species with *punctata*, has the "point of maximum width . . . more posterior" than in *arctifrons*.

Both *arctifrons* and *punctata* have a shorter, more convex pronotum than does *truncatula*, with the sides more subangulate and more constricted to the base, and the hind angles more distinct, but these three species can readily be confused. Some individuals of *truncatula* even resemble some *levicosta* (New Mexico, Texas; Chihuahua) if they have the clypeus emarginate in front (as in some examples from Ciudad Victoria, Tamaulipas, Mexico), and the front angles of the pronotum nearing the acute. The male genitalia of *levicosta*, however, are more elongate, and the sides of the clypeus are sinuate, not truncate as in *truncatula*.

This species has been taken at the same time and place as *punctata* (rounded clypeus, short elytral marginal hairs) in Marathon, Texas, and Montemorelos, Nuevo Leon, and as *arctifrons* in Zimapan, Hidalgo. From the last-named locality, which is about the southern limit of the range for both species con-

cerned, two males and two females appear to be *truncatula* and one male seems to be *arctifrons*, but the *truncatula* specimens have the hind coxal plate somewhat angulate at the sides, which is not typical of the species, and the *arctifrons* specimen has the sides of the clypeus truncate instead of sinuate and the sides of the pronotum not especially constricted at rear. In Mexico *truncatula* is evidently more numerous in the northeast (Nuevo Leon, Coahuila, Tamaulipas) than in the northwest (Durango and Chihuahua) where only a few specimens have been collected (17 of 600). On the other hand, *arctifrons* is abundant in the northwest and scarce (five of 880 specimens) in the northeast.

Diplotaxis arctifrons Bates

Figures 76, 84, 86

Diplotaxis arctifrons BATES, 1888 (1887-1888), p. 163 (Durango City [Durango], Mexico; type, female, in British Museum).

DIAGNOSIS: Some individuals are similar to some of any of the other species of the group, excepting *pumila*, but the front margin of the clypeus, when typical (fig. 76), differs in shape, with the angles dentiform and the sides sinuate. Differs further from *truncatula* principally by having the sides of the hind coxal plate angulate.

RANGE: Northwestern Mexico but not Sonora, south and east to San Luis Potosi and Hidalgo. A total of approximately 880 specimens have been examined. (See Appendix for further data.)

DESCRIPTION: (See also characters of group). Length, 6.5 to 8.5 mm. Color usually black, or dark red with head black. Head convex in front, but not ridged, densely punctured. Clypeus more than one-half of the length of head, sometimes less, punctured as on head, sides narrowing to front margin, which is either truncate, or slightly emarginate between blunt dentiform angles (in a few specimens deeply emarginate), all margins reflexed to varying degrees, sides slightly or strongly sinuate. Labrum and mentum as in *truncatula*.

Pronotum convex, transverse, punctures of disc of same size as on head but sparse, sides strongly arcuate from just behind middle to

front angles which are somewhat acute (in some specimens not acute), in most specimens the outer margin of the angle is raised and strongly margined, hind angles obtuse, in some specimens slightly constricted in front of base, base may be slightly depressed. Elytra about three times longer than pronotum; second interval irregularly unipunctate or multipunctate; costae virtually impunctate; marginal hairs at middle longer than width of a sutural interval (in some specimens as long as scutellum). Metasternum as in *truncatula*. Hind coxal plate distinctly angulate in front except in a few specimens. Abdominal ridge strongly elevated and extending to the spiracles and usually also to corner of pygidium, fifth segment with groove vague in some specimens. Pygidium as in *truncatula*.

Front tibiae with third or basal tooth near middle. Hind femora and claws as in *truncatula*. Male genitalia as in figures 84 and 86; basal piece a little longer than lobes.

SEXUAL DIMORPHISM: As in *truncatula*.

REMARKS: The range of this species overlaps the ranges of all the others except *pumila* (Arizona) and *punctata* (United States and northeastern Mexico). In Durango and Chihuahua it is the most abundant of the species; only a few specimens of *truncatula* and *levicosta* have been found there, whereas about 500 *arctifrons* have been collected from these two states. I have not seen it from the United States, unless the tiny species (*atratura*) from Dona Ana County, New Mexico, and southern Texas should be considered the same species (see *atratura* for discussion).

A few individuals with the clypeus rather strongly indented in front and the angles therefore more prominent might be misidentified as *levicosta*, except that the male genitalia differ. As for *arctifrons* and *truncatula*, if the clypeus in either species is worn, then the strongly angulate sides of the hind coxal plate of *arctifrons* is usually sufficiently diagnostic. Both these species, however, show great variability as do some other species with rather extensive distributions (*cribulosa*, *aenea*, *subangulata*). In *arctifrons* the clypeus varies in the width at the apex, in the degree of reflection, in the sharpness or prominence of the front angles; the pronotum sometimes

has a greater or lesser degree of angulation of the lateral margins and the punctuation of the disc varies (usually sparser than in *truncatula*); the elytra may be shining or rather opaque; the punctures in the second elytral interval vary from small to large and in some specimens are placed in a nearly single row as is typical of *atratura*; even the tarsal claws are not uniform, being less abruptly bent in some individuals. The genitalia of the male (fig. 86) are short and straight, without the apical "knobs" on the lobes that are characteristic of *truncatula*; they seem to be similar, from a dorsal view, to those of *atratura*, but in profile are not sinuate as in *atratura* (figs. 84-86). The genitalia are almost like those of *punctata*, although the latter have the base of the lobes proportionately wider in comparison with the apices than in most *arctifrons*. These two species are indeed very similar, except that all the specimens of *punctata* that I have seen have short, not long, marginal hairs.

From four localities in Mexico (San Juan del Rio in Durango; Matanzas and Lagos in Jalisco; Zacatecas in Zacatecas) I have examined 35 specimens that appear to be *arctifrons*, but they are dark red, not blackish, some of them are larger than usual and have the sides of the clypeus not sinuate, and one-third of them have the hind coxal plate rather truncate instead of angulate laterally. These specimens, except for the fact that the lobes of the genitalia of the male are wide at the base as in *punctata*, could be placed with *truncatula*, but they are not exactly like either *arctifrons* or *truncatula*, and I hesitate to describe them as a third species in this complex of extremely similar and variable species.

Still another series (five specimens from Zimapan, Hidalgo) is also a puzzle. One of the specimens resembles those mentioned above in respect to genitalia, color, and size, but has the coxal plate angulate, and I consider it to be *arctifrons*. The four other specimens (two of which are males) have the genitalia and hind coxal plate more as in *arctifrons*, but the pronotum and clypeus as in *truncatula*. These four I have placed as *truncatula*, because some few individuals of *truncatula* have the hind coxal plate somewhat angulate, and some have the apices of

the genitalia less knobbed, as in these specimens. Perhaps additional specimens from these areas will help to solve the problem of the relationship of these species.

Three specimens of *arctifrons* from the state of San Luis Potosi (Tepetate and San Luis Potosi) present another variation in that the clypeus is so emarginate and so narrowed in front that the dentiform angles are very close together. These specimens have the clypeus about intermediate between that of the type specimen and that of most other specimens.

Diplotaxis atratura LeConte

Figures 77, 85, 86

Diplotaxis atratura LECONTE, 1856, p. 270 ("Frontera, New Mexico"; syntypes in the Museum of Comparative Zoölogy).

DIAGNOSIS: In its smaller size and less bent claws, this species resembles *pumila* and differs from the other species of the group. Differs from *pumila* (Arizona) as stated below. The clypeus has round angles, as in *pumila* and in most individuals of *punctata*, not sharp or bluntly dentiform angles as in the other species.

RANGE: New Mexico and southwestern Texas south in northwestern Mexico to southern Durango and to Zacatecas. Specimens examined total 46 (see Appendix).

DESCRIPTION: (See also characters of group). Length, 5 to 7 mm. Color dark red to black. Head convex, densely, confluent punctured, transversely tumid or ridged behind clypeus. Clypeus one-half of the length of head, punctures dense as on head but not confluent, front margin truncate or emarginate and scarcely reflexed between broadly rounded angles, sides not sinuate, slightly narrowing to front. Labrum and mentum as in *truncatula*.

Pronotum with punctures of disc sparser than those of head, sides strongly arcuate behind middle, front angles acute, hind angles obtuse, base in some specimens with slight depression at middle. Elytra not quite three times longer than pronotum; second interval unipunctate, in a few specimens slightly irregular; costae impunctate; marginal hairs as in *truncatula*. Metasternum as in *truncatula*.

Hind coxal plate at sides slightly angulate in front, at least the edge extends over onto the elytral margin. Abdominal ridge, fifth segment, pygidium as in *truncatula*, except that ridge in some specimens reaches the pygidium.

Front tibiae with third tooth at or slightly in front of middle. Hind femora as in *truncatula*. Claws not abruptly bent, but cleft near apex, tooth shorter than claw. Male genitalia nearly as in figures 85 and 86 of *arctifrons* (side view); basal piece same length as lobes.

SEXUAL DIMORPHISM: As in *truncatula*, but the shape of the pygidium is not constant because it is quite transverse in some females.

REMARKS: It is curious that there are no specimens of this species available from the extensive area between Durango, Mexico, and Texas, but *arctifrons* occurs there. The shape of the clypeus (figs. 76, 77) or the ridge on the forehead of *atrátula* distinguishes the two species (*arctifrons* has the head flat or slightly convex). In addition, in *atrátula* there is less marked angulation of the sides of the hind coxal plate, more consistently a single row of punctures on the second interval of the elytra, usually more acute front angles of the pronotum, and narrower lobes of the male genitalia which are also more sinuate in profile (figs. 84, 85). These differences, however, are relative, and there is no doubt that the species are very similar. They both occur in Durango and Zacatecas.

Diplotaxis atrátula differs from *pumila* (Arizona) principally by having different male genitalia (not at all pincer-like), hairs on the clypeus, and long marginal hairs on the elytra. It is similar to *rufipes* Moser (Oaxaca), but *rufipes* has hairs on the clypeus and no lateral ridge on the abdomen.

Possibly two species are concerned here instead of one variable one. Specimens from Durango and Zacatecas (also one specimen from Davis Mountain Junction, Texas) differ slightly from the type of *atrátula* and from specimens from New Mexico and from Big Bend National Park and Van Horn, Texas, by having the front margin of the clypeus truncate instead of shallowly emarginate, and by having the punctures of the second elytral interval as large as those of the striae on each side and nearly filling the interval, the entire surface rather shining (the

other specimens are rather opaque and have smaller punctures, some having an irregular double row of punctures). The tarsal claws seem to be somewhat more elongate and less bent in the Mexican specimens, but this is a difficult character to assess. Additional material from other areas is needed before this problem can be clarified.

Diplotaxis levicosta Fall

Figures 75, 79, 80

Diplotaxis levicosta FALL, 1909, p. 87, pl. 1, fig. 53 (Albuquerque, New Mexico; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Differs from the other species of the group principally by having the front of the clypeus distinctly emarginate and the front angles prominently dentiform, whereas the others have the front virtually truncate (except in some specimens of *truncatula*), and the angles either not dentiform or not prominent. There is no ridge on the front of the head, the front tibiae have the third tooth median in position, and the hind coxal plate is angulate at the sides.

RANGE: New Mexico and southwestern Texas into northern Chihuahua in northwestern Mexico. A total of 14 specimens has been examined (see Appendix for further data).

DESCRIPTION: (See also characters of group). Length, 7 to 8 mm. Color dark red, head black in many specimens. Head convex, densely punctured in part, but impunctate or less punctate behind clypeal suture in some specimens. Clypeus about one-half of the length of head, punctures as dense as or denser than those on head, front margin emarginate in a shallow V, and strongly reflexed between sharp or blunt and prominent dentiform angles, sides narrowing to front, slightly or strongly outwardly sinuate behind front angles. Labrum concave from side to side, sides prominent; same length as reflexed under side of clypeus and faintly punctured. Mentum as in *truncatula*.

Pronotum convex, punctures of disc sparse and irregular, disc in some specimens longitudinally vaguely depressed, sides strongly arcuate and widest behind middle, thence rounded to obtuse hind angles, slightly sinuate to acute front angles, which are somewhat elevated, whereas area behind front angles is

depressed. Elytra three times longer than pronotum, punctures larger, but of same sparseness; second interval irregularly unipunctate, in some specimens punctured in double rows in apical half; costae impunctate or with one or two punctures; marginal hairs at middle almost as long as scutellum. Metasternum as in *truncatula*. Hind coxal plate laterally slightly angulate in front and extending onto elytral margin. Abdominal ridge reaching posterior spiracle and strongly elevated throughout; fifth segment as in *truncatula*. Pygidium moderately punctured.

Front tibiae with third tooth at or even behind middle. Hind femora and claws as in *truncatula*. Male genitalia as in figures 79 and 80; basal piece same length as lobes.

SEXUAL DIMORPHISM: About as in *truncatula*, except that the differences are usually too slight for easy external identification of the sexes.

REMARKS: In addition to the characters given in the diagnosis above, this species has the front angles of the pronotum not only acute, but also rather impressed within in such a way that they appear to stand upward. This feature and the V-shaped clypeus and the arcuate male genitalia (figs. 75, 80) are the only external distinguishing characters between this species and *arctifrons*. Specimens with the clypeus worn down and the marginal hairs of the elytra also worn short would be difficult to separate from some individuals of *punctata*, except that all the specimens of *levicosta* examined have the abdominal ridge strongly carinate to the last spiracle, whereas most of the *punctata* seen have the ridge weaker on the hind segments than on the front ones. Also the hind femora of *levicosta* are stouter and more emarginate.

This species is quite rare in comparison with the others, except *pumila*, only 14 specimens having been examined. Only two specimens have been seen from Mexico, one of these from just south of the border of Texas.

Diplotaxis punctata LeConte

Figures 83, 84

Diplotaxis punctata LECONTE, 1856, p. 270 ("Frontera, Rio Grande" [=New Mexico]; type in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 52 (clypeus).

Diplotaxis acerba FALL, 1909, p. 64, pl. 1, figs.

32, 34 (Texas; type, male, in the Museum of Comparative Zoölogy). New synonymy.

Diplotaxis fulgida CAZIER, 1940c, p. 130 (Smith County, Texas; type, male, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: This coarsely punctured species differs from the others of the group in the big, shining, crowded punctures of the upper surface. The marginal hairs are shorter than those of the other species except *pumila* (Arizona), and the labrum is flatter. The sides of the pronotum are strongly sinuate in most specimens, the elytra very convex, often appearing round, and the hind femora scarcely emarginate before apex.

RANGE: From Kansas and Texas south to Nuevo Leon and Tamaulipas in northeastern Mexico; also New Mexico, and one specimen each from Utah and Nevada. (See Appendix for the 90 specimens examined.)

HABITAT: Three specimens from Karnes County in southeastern Texas are labeled as "injuring fruit trees."

DESCRIPTION: (See also characters of group). Length, 6 to 8 mm. Color light or dark red. Head densely punctured, with or without a slight post-clypeal ridge that may be interrupted at middle. Clypeus as in *truncatula*, except that front margin is more reflexed and is either rounded from side to side or truncate in front between rounded angles, the sides not sinuate. Labrum and mentum as in *truncatula*, but labrum flatter behind.

Pronotum convex, punctures of disc usually sparser than those of head, but dense in some specimens, center in some with impunctate area or vague longitudinal depression, sides strongly arcuate and widest near middle, front angles right, in some specimens acute, hind angles obtuse. Elytra about three times longer than pronotum, punctures larger and denser than those on pronotum; second interval filled with punctures (confluent in some specimens) in two or three irregular rows; costae impunctate or with occasional punctures, in some specimens costae interrupted by invading punctures of intervals; marginal hairs at middle no longer than width of one sutural interval. Metasternum as in *truncatula*. Hind coxal plate laterally with angular projection in front or at middle of sides that fits over reflexed elytral margin. Abdominal ridge stronger on first two segments than

on last three in most specimens, fifth segment deeply grooved above pygidium. Pygidium sparsely or densely punctured.

Front tibiae with third or basal tooth at or slightly behind middle. Hind femora nearly straight, no more than very weakly emarginate before apex, no wider than the length of second abdominal segment. Claws as in *truncatula*. Male genitalia as in figures 83 and 84; basal piece same length as lobes or very slightly longer.

SEXUAL DIMORPHISM: About as in *truncatula*, but the slight differences make sexual distinction difficult.

REMARKS: Fall (1909), who had all the species of the group in his revision, found this species more likely to be confused with *truncatula* than with any other species. The characters he gives are subject to the same variation as those of *truncatula*. The marginal hairs of the elytra, however, are as long as the scutellum in fresh specimens of *truncatula* and no longer than the width of a sutural interval in all specimens of *punctata* examined (about 90), and the lobes of the male genitalia of *punctata* taper markedly from the wide base to the narrow, although slightly knobbed, apices, whereas the apex and base of the lobes are equally wide in *truncatula*.

Some specimens have the pronotum more suddenly constricted to the base and strongly sinuate to the front angles; some (as the type) have the clypeus vaguely hemihexagonal, not so rounded; some appear to have the sides of the elytra more parallel, not so broadly arcuate; some have the elytra less confusedly punctate. After examination of the types of *punctata*, *acerba*, and *fulgida*, I believe that the last two represent but individual variations of *punctata* and are therefore synonymous with it. Fall (1909, p. 95) placed *levicula* Casey as a synonym without comment, but my examination of *levicula* shows that it is, rather, a synonym of *carbonata* LeConte, a species with no lateral ridge on the abdomen.

The type locality of *punctata* ("Frontera, Rio Grande") does not appear on the modern maps available to me, but for *atrátula*, LeConte gives "Frontera, New Mexico," the type specimens of both species having been collected by a Mr. Clark. Fall (1909) reports other specimens of *punctata* from New Mexico (Roswell and Tecumcari).

Diplotaxis pumila Fall

Figures 74, 123

Diplotaxis pumila FALL, 1909, p. 82, pl. 1, fig. 44 (Bavoquivaria [Baboquivari] Mountains, Arizona; type, female [?], in the Museum of Comparative Zoölogy).

DIAGNOSIS: This tiny species is distinct from the other species of the group because of the hairs on the clypeus, the "pincer" type of male genitalia (fig. 123), and the more acute and narrower front angles of the pronotum (fig. 74). It has shorter marginal hairs and more rounded clypeus than do all the species except *punctata*, and less bent claws than all but *atrátula*.

RANGE: Southern and central Arizona, and reported by Fall from "New Mexico." A total of 17 specimens has been examined. (See Appendix.)

DESCRIPTION: (See also characters of group). Length, 4.5 to 5.5 mm. Color black or dark red, head often darker than pronotum and elytra. Head convex, densely punctured, in some specimens confluent, area behind clypeus often slightly less punctate. Clypeus sparsely hairy, more than one-half of the length of head, punctured as on head, front margin nearly semicircular but actually truncate between rounded angles, margins scarcely reflexed, sides obliquely converging to front, not at all sinuate. Labrum broadly hollowed out at middle, the sides prominent but not actually bilobed, about same length as under side of clypeus, densely punctured. Mentum flat, with only a few hairs where the apical declivity is normally expected to be.

Pronotum convex, punctures of disc sparser than those of head, but punctures on sides dense, sides gently arcuate and widest behind middle, thence sinuate to front angles, which are distinctly produced and acute, and rounded to obtuse hind angles. Elytra almost three times longer than pronotum but appearing shorter, punctures about as on pronotal disc, but in some specimens confluent or rugose; second interval with single row of large punctures (some specimens with additional scattered punctures towards apex); costae virtually impunctate, but slightly punctured in some specimens; marginal hairs at middle shorter than width of one sutural interval. Metasternum scarcely longer than width of

hind femora. Hind coxal plate slightly angulate in front and extending onto elytral margin. Abdominal ridge strong throughout, reaching to pygidium, fifth segment of abdomen with transverse line of single punctures that resemble a groove (this part often covered by elytra). Pygidium large, with a few large sparse punctures.

Front tibiae with third or basal tooth slightly, if at all, in front of middle. Hind femora as in *truncatula*. Claws gently curved, cleft near apex, tooth much shorter than claw. Male genitalia as in figure 123 of *catarinas*; basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *truncatula*, with the additional fact that the hind femora of females are twice as wide as the length of the second abdominal segment.

REMARKS: Although the presence of the ridged abdomen and of the impunctate elytral costae seems to ally this species with the *truncatula* group, the hairy clypeus associates it also with the *trapezifera* group, especially the species *bifida* and *rufipes* (from Mexico). In the *truncatula* group, *pumila* agrees in its small size and single rows of elytral punctures with *atrutula*, but differs in the clypeal hairs and absence of a frown on the front of the head.

Fall in 1909 (p. 8) called this "the smallest species of the genus known to me." His statement is apparently still correct, because, although a number of species that were unknown to him are almost as small (*academia*, *bifida*, *brevicornis*, *durango*, *parvula*, and *rufipes*), none is so small as 4.5 mm.

The male genitalia resemble those of *catarinas* (*trapezifera* group) from Chihuahua and Durango, a species with dentiform clypeus, large eyes, and no ridge on the sides of the abdomen.

This is the only species of the group not recorded from Mexico.

SPECIES GROUP *ATRAMENTARIA*

Eight species are placed here: *Diplotaxis atramentaria* Bates; *barbarae* Vaurie and Cazier; *exstans*, new species; *sinuans*, new species; *kuschei*, new species; *tzitzio*, new species; *commixta*, new species; and *mexcala*, new species.

These glabrous Mexican species are char-

acterized chiefly by their lack or virtual lack of punctuation on the costae of the elytra and by the same general type of male genitalia. This lack of punctures is actually more an impression than a fact, because, if one tips the specimens to see the entire costae, one finds punctures at the extreme base and apex in most individuals. On the disc of the elytra, however, punctures are absent or scarce; even in *atramentaria*, which has more punctures, the punctures are scarcely noticeable because of their small size and the opacity of the surface. In addition, the species have small mandibles (not large as in the *marginicollis*, *brevicollis*, or *simplex* groups), the labrum flat or convex or shallowly concave (not deeply concave as in the *marginicollis* group), and the clypeus not truly hairy (as it is in the *trapezifera* group) and either dentiform, bi-angulate, or with rounded angles (specimens with rounded angles might be confused with the *frondicola* group). All the species have 10-segmented antennae, the tarsal claws cleft near the apex (longer in the males of some species), and the marginal hairs of the elytra short and sparse. The groove of the propygidium is lacking or faintly indicated. The sides of the abdomen are sharply angulate, not rounded, in individuals of some species, but not actually ridged as in the *truncatula* group. The size of the eyes, the impression of the palpi, the punctuation of the scutellum, and the surface of the elytra (lustrous or opaque) vary among species. Minute hairs are visible under high magnification, either in the punctures of the elytra or just behind the front margin of the clypeus.

Nearly 1000 specimens have been examined, including the types of all the forms (over 600 specimens belong to one species, *barbarae*). In the descriptions that follow, each species is compared with the lectotype of *atramentaria*. Habitat notations are available for *barbarae* only.

DISTRIBUTION OF THE SPECIES

All eight species are from Mexico, four being restricted, so far as now known, to three states (two species to Guerrero, one to Michoacan, one to Sinaloa). The others are from central Mexico (*atramentaria*) or extend the length of Mexico, chiefly in the west.

KEY TO THE SPECIES OF THE *atramentaria* GROUP

1. Pronotum (fig. 88) not more than one-third of the length of elytra, its sides bulging and sinuate, front angles drawn far forward to almost needle-like points; elytra shining, not opaque, their costae (ribs) wide, flat, and, in middle third, impunctate or with one puncture; color not black; Sonora to Chiapas; Hidalgo; Nuevo Leon . . . *commixta* in part
Pronotum and elytra not exactly as above; color black or red 2
2. Clypeus dentiform (fig. 88) 3
Clypeus rounded or obtusely angled 5
3. Labrum densely, coarsely punctured, concave at middle, the sides prominent, not longer than under side of clypeus; mentum flat; male with first segments of middle and hind tarsi prolonged on inner side (fig. 96); Chi-huahua, south to Oaxaca *exstans*
Labrum weakly, if at all, punctured, flat or convex; variable in length; male with tarsal segments normal, not prolonged 4
4. Tarsal claws bent abruptly at right angles at middle, and shorter than one-half of claw segment; elytra with punctures distinctly larger than those on pronotum, costae convex, shining; Michoacan *tzitzio*
Tarsal claws bent less abruptly and at apical third, and longer than one-half of claw segment; elytra with punctures as small as those on pronotum, costae flat, opaque (without luster); Oaxaca . . . *barbarae* in part
5. Elytra with reflexed margins (epipleurae) as wide from middle to near apex as the outermost (contiguous) elytral interval, often sinuate ("swirling"); Guerrero . . . *sinuans*
Elytra with reflexed margins narrow from middle to apex (scarcely wider than one row of elytral punctures); Guerrero or elsewhere 6
6. Male with first segments of middle and hind tarsi prolonged at inner apex (fig. 95); known only from type; Sinaloa . . . *kuschei*
Male with tarsal segments normal, not prolonged 7
7. Elytral surface opaque (without luster), punctures of first and second intervals as small and sparse as those on disc of pronotum; costae flat, level with other, broader intervals 8
Elytral surface shining, punctures of first and second intervals larger, coarser, and denser than those on disc of pronotum; costae flat or convex, but raised above surface of other intervals 9
8. Chiefly across central Mexico (not north of Mexico City or as far south as Oaxaca); labrum rather convex, wider (front margin

less curved), usually standing out from and longer than under side of clypeus; males with tarsal claws bent abruptly at middle and shorter than in *barbarae*, genitalia with longer, narrower lobes (fig. 216)

. *atramentaria*

Chiefly northwestern Mexico and southern Mexico (in Oaxaca), but occasional in area between; labrum flatter, narrower (front margin strongly curved), usually level with and no longer than under side of clypeus; males with claws bent less abruptly at apical third, longer than half of the claw segment, genitalia stouter (fig. 219), often hairy apically *barbarae* in part

9. Lobes of male genitalia horizontal, and rounded or truncate at apex (fig. 216); color dark red or reddish; elytra three times longer than pronotum; mentum with apical declivity prominent, strongly advanced; Guerrero and elsewhere *commixta* in part

Lobes of male genitalia slightly curved downward and acuminate apically (fig. 212); color black (in 31 of 34 specimens); elytra scarcely longer than twice the pronotum; mentum flat; Guerrero *mexcala*

Diplotaxis atramentaria Bates

Figure 216

Diplotaxis atramentaria BATES, 1888 (1887-1888), p. 163 (type locality not designated; lectotype, female, Cuernavaca, Morelos, Mexico, here designated from original series in British Museum).

DIAGNOSIS: Exceedingly similar to *sinuans* and *barbarae*, differing from the latter as stated in the diagnosis of that species, and from *sinuans* by having the reflexed margins of the elytra narrow in apical half, not widened or sinuous, and no prolongation of the tarsal segments of males (some males, however, have a very slight indication of a projection). The surface of the elytra is rather opaque (as also in the above-mentioned species), not shining; the punctures are small, not large or deep as they are in *commixta*.

RANGE: Central Mexico from the coast of Guerrero and Colima in the west to Veracruz and Hidalgo in the east. About 150 specimens have been examined (see Appendix).

DESCRIPTION OF LECTOTYPE, FEMALE: Length, 9 mm. Color piceous, appearing black. Head finely and densely punctured, rather confluent at center, descending obliquely to clypeal suture which is visible. Cly-

cus without hairs, punctured as on head, about one-third of the length of head, trapezoid, front and side margins straight and about equal both in their length and in their very slight degree of reflection, angles obtusely rounded. Eyes well separated, each eye about one-sixth of the width of head. Antennae 10-segmented. Maxillary palpi with last segment not impressed. Mandibles small. Labrum flat but apparently projecting a little beyond level of under side of clypeus, a little longer than under side of clypeus, sides not prominent, front margin arcuate. Mentum with declivity in anterior third rather prominently extending forward, posteriorly margined, arcuate, and pubescent.

Pronotum convex, punctures of disc of same size as those on head but sparse, sides near apex strongly margined and slightly raised; strongly arcuate and widest just behind middle, thence sinuate to acute front angles and curved strongly back to obtuse but sharply pointed hind angles. Scutellum densely punctured on sides. Elytra almost three times longer than pronotum, punctures of same size but sparser; second interval multipunctate; costae flat, with row of smaller, exceedingly sparse punctures; marginal hairs sparse, shorter than width of one sutural interval. Abdomen not ridged laterally. Pygidium punctured moderately (punctures not touching). Propygidium not grooved.

Front tibiae with two apical teeth close together, third tooth smaller, more remote than others and placed slightly in front of middle. Hind femora not wider than length of second abdominal segment. Middle tarsi with first segment longer than second, hind tarsi with it shorter, hind tarsi shorter than tibiae. Setose carinae of hind tibiae distinct. Claws bent angularly, cleft subapically, tooth slightly shorter and wider than claw and close to it.

SEXUAL DIMORPHISM: Genitalia of male as in figure 216; basal piece shorter than lobes. In comparison with females males have the pygidium transverse, the first hind tarsal segment as long as the longer spur (shorter than spur in females); spurs narrower, the fifth abdominal segment shorter than the fourth (equal in length in females). Females have wider hind femora and wider apices to the hind tibiae. The hind tarsi in males are as long as or longer than the tibiae.

VARIATIONS FROM LECTOTYPE: The length varies from 7.5 to 11 mm. Some specimens differ by having: clypeal suture obliterated by punctures; clypeus with front margin slightly emarginate and with sharper and more reflexed (but not dentiform) angles; clypeus one-half of the length of head; each eye one-fifth of the width of head; labrum very faintly punctured; last palpal segment depressed or flattened; mentum with declivity shorter (in apical fourth); some costae impunctate, or with from five or six to a dozen punctures; pronotal front angles obtuse or rectangular, not acute; surface of elytra opaque; sides of abdomen sharp but not ridged. Specimens examined have the reflexed elytral margins narrow from middle to apex, no wider than one row of punctures, and the under side of the clypeus weakly furrowed, but these characters were not noted in the lectotype.

REMARKS: Bates had two specimens (which I have examined) at the time of his description. One of these, marked as a male by Bates, is a female of another species, *truncatula* LeConte (the specimen is a bit dirty but the ridged sides of the abdomen are visible); the other is the female chosen by me as lectotype. Bates's description is a mixture of both specimens, he himself being a little doubtful about the sex. Some of the other specimens he had are also different species, one (from Peras, Oaxaca) being *exstans* which has prolonged first tarsal segments in the males and a dentiform clypeus. I have not seen any individuals of *atramentaria* with the clypeus dentiform as it is in *exstans* and in some specimens of *commixta* and *barbarae*. Typical specimens have the head and clypeus very broad (much as in *sinuans*) with the angles broadly rounded, not sharp as in most specimens of *barbarae*, *mexcala*, or *commixta*. Nearly one-third of the specimens seen by me were collected by Robert K. Selander at the same time and place (El Mogote, Guerrero) as the only known series of *sinuans*. The lobes of the male genitalia (fig. 216) in typical specimens are longer, narrower, and more separated (not contiguous on their inner side) than are those of the other species of the group, but in some specimens (as two from Tehuacan, Puebla, and one from Teloloapan, Guerrero) they appear proportionately wider, yet not so wide as

those of *barbarae*. About 25 males of *altramentaria* were dissected, and 10 or 12 of *barbarae*.

***Diploaxis barbarae* Vaurie and Cazier**

Figures 87, 219

Diploaxis barbarae VAURIE AND CAZIER, 1955, p. 13, figs. 1, 2A, 3C (Santa Barbara, Chihuahua, Mexico; type, male, in the American Museum of Natural History).

DIAGNOSIS: This species is very similar to *atramentaria*, but both species are so variable that differentiation is in many instances uncertain. It differs, generally speaking, from *atramentaria* by having the labrum smaller, shorter, more arcuate in front, not advanced forward (in repose), the eyes larger and closer together, the elytral costae with fewer punctures, the tarsal claws of the males longer and bent nearer the apex, and the lobes of the genitalia broader, usually with hairy apices.

RANGE: Southern Chihuahua and Durango in northwestern Mexico south to the city of Oaxaca (but not the states of Michoacan or Guerrero) (fig. 87). A total of 780 specimens has been examined (see Appendix), mostly from Oaxaca.

HABITAT: A specimen from San Juan del Rio, Durango, was collected on *Baccharis glutinosa* in August of 1951 by P. D. Hurd, Jr., and one from El Tascate, Durango, in July "on juniper," a quite different taste in plants if the specimens were actually feeding on them. A large series of 600 specimens were collected by P. and C. Vaurie at various dates in July, 1955 (before July 16) at night on young trees of *Enterolobium cyclocarpum* and young pepper trees (*Schinus molle*), near the statue of Juarez overlooking the city of Oaxaca. More than 900 individuals of eight or nine other species were collected on these trees on the same hillside (see also part 1, Vaurie, 1958, *zapoteca*, p. 355, and *spina*, p. 307). In 1959 the same spot in Oaxaca was revisited by the same collectors on the night of August 3, but only one specimen of *barbarae* was found, and no other species, after careful searching.

DESCRIPTION: Length, 7.5 to 10 mm. Color dark red or reddish with black infuscations. Head coarsely and densely punctured, descending abruptly to clypeal suture which may be visible or not. Clypeus with a few tiny hairs behind front edge, punctured as on

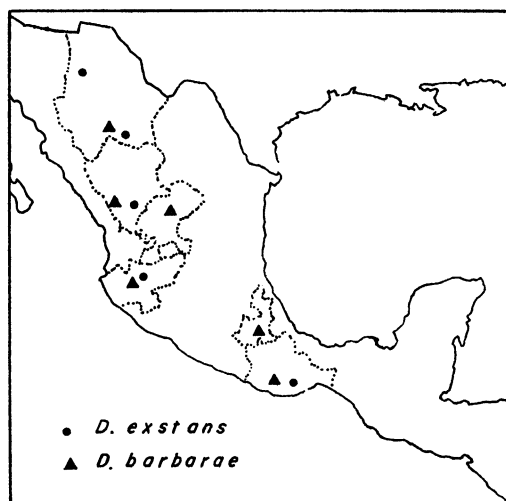


FIG. 87. Distribution of *Diploaxis exstans* and *D. barbarae*.

head, either one-third or one-half of the length of head, front and side margins as in description of lectotype of *atramentaria*, except some specimens with front slightly emarginate and some (from Oaxaca only) with angles dentiform. Each eye about one-fifth of the width of head. Maxillary palpi with last segment impressed. Antennae and mandibles as in *atramentaria*. Labrum flat, level with and about same length as or slightly longer than reflexed under side of clypeus, weakly punctured, front margin arcuate. Mentum as in *atramentaria*, but declivity in some specimens in apical fourth.

Pronotum as in *atramentaria*, except front angles in some specimens not so acute. Scutellum, abdomen (sharply edged laterally), and elytra (surface opaque) as in *atramentaria*, except costae of elytra with only six or eight or fewer punctures and marginal hairs slightly longer than width of a sutural interval. Pygidium densely punctured. Propygidium with indistinct groove or none at all. Legs and claws as in *atramentaria*, except that hind tarsi are as long as hind tibiae, and claws in males differ (see below). Male genitalia as in figure 219, but hairs not always visible; basal piece shorter than lobes.

SEXUAL DIMORPHISM: Not much difference is visible between the sexes in regard to the shape of the pygidium, the length of the fifth abdominal segment, or the widened apex of

the hind tibiae, but males can be distinguished by the longer first segment of the hind tarsi, narrower tibial spurs (females have this segment distinctly shorter than the longer spur, not the same length), and narrower hind femora (narrower than the length of the second abdominal segment). The claws of the males seem longer and less abruptly bent. Some males have the first segment of the middle and hind tarsi just perceptibly widened and spined on the inner apical angle.

REMARKS: Although this species has the same general range as *exstans* (which differs by having a dentiform clypeus, and the males by having distinctly prolonged tarsal segments), i.e., from Chihuahua south to Oaxaca, the two species have not been taken in the same localities. A species that appears more closely allied to, and is more difficult to distinguish from, *barbarae* is *atramentaria*. A small and fairly constant difference is shown, however, in the tarsal claws of the males, which are longer in *barbarae* (longer than half of the claw segment) and are not only bent less abruptly (in *atramentaria* the bend is a distinct right angle), but are bent in the apical third, not at the middle. The male genitalia of *barbarae* have also broader, proportionately shorter lobes that are broad throughout (not narrowing at middle) and usually show some hairs within the apices; when the lobes in *barbarae* are not spread apart, they have their inner sides contiguous and straight, whereas in *atramentaria* there is a space between them. In comparisons made of specimens of both species of different sizes, however, these differences are not always evident. The identity of some specimens from Jalisco, Guerrero, Morelos, and Puebla (although I have placed them in one species or the other) is open to doubt, because the above correlation of claws and genitalia does not hold true. I have seen, however, two males (dissected) from Puebla that are undoubtedly *barbarae*, and three males (dissected) from Petlalcingo (south of Puebla and near the northern border of Oaxaca) that are undoubtedly *atramentaria*.

The problem of these two species is complicated further by the fact that the most northern and southern populations of *barbarae* show some differences, those from the north being in general smaller and paler and having

the labrum more advanced (almost as in *atramentaria*), but those from Oaxaca being larger and darker, and having the labrum flatter against the under side of the clypeus. Of 136 northern specimens, none has the clypeus dentiform, although the angles may be somewhat sharp, but of approximately 600 specimens from Oaxaca, eight individuals (both sexes involved) have the clypeus distinctly dentiform (as in *exstans* and *tzitzio* and some *commixta*, from which they differ as shown in the key). If the situation were reversed, and the majority had the clypeus dentiform, it would be more logical, because a few specimens might have the teeth worn down. As it is I cannot explain the occurrence of the toothed clypeus among so many specimens with it not toothed.

***Diplotaxis exstans* Vaurie, new species**

Figures 87, 96, 219

TYPE MATERIAL: Type, male, Catarinas, Chihuahua, Mexico, July 25, 1947, 5800 feet, David Rockefeller expedition, Spieth, collector, and nine male paratopotypes in the collection of the American Museum of Natural History. One male paratopotype in the Zoologisches Museum, Berlin; one male paratype, "Oajaca" [Oaxaca], Mexico, in the British Museum; one male paratype, Etzatlán, Jalisco, Mexico, August, 1934, P. W. Avery, collector, in the United States National Museum.

DIAGNOSIS: Although resembling *sinuans* and *kuschei* in the produced tarsal segments of males, this species differs from them and from others of the group by having the labrum coarsely, densely punctured and at the middle concave (or broadly emarginate), the sides prominent (not convex or flat throughout), and the mentum virtually flat. The clypeus is definitely dentiform in all specimens seen.

RANGE: Chihuahua, Durango, and Jalisco in northwestern Mexico south to the Isthmus of Tehuantepec, but no specimens were available from the area between Jalisco and Oaxaca (fig. 87). Additional specimens (46) examined from Chihuahua, Durango, and Oaxaca are listed in the Appendix.

DESCRIPTION OF TYPE, MALE: Length, 9 mm. Color a mixture of black and dark red.

Head as in description of lectotype of *atramentaria*, but punctures not confluent. Clypeus as in *atramentaria*, except margin is truncate in front between blunt dentiform angles, and the side margins are sinuate. Eyes larger, each eye about one-fifth of the width of head. Antennae and mandibles as in *atramentaria*. Last segment of maxillary palpi impressed. Labrum shallowly concave at center, the sides prominent and advanced, level with but not longer than under side of clypeus, front margin arcuate, surface distinctly, moderately punctured. Mentum flat, anterior declivity in apical fourth not extending forward, its posterior edge evident only because of the few hairs and the punctures from which they emerge.

Pronotum not appearing very transverse and front angles distinctly produced and acute, otherwise pronotum as in *atramentaria*. Scutellum, elytra, abdomen, pygidium, and propygidium as in *atramentaria* (reflexed elytral margins narrow from middle to apex), except there are at least a dozen punctures in the elytral costae, and surface of elytra rather rugose. Front tibiae, hind femora, setose carinae, and claws as in *atramentaria*. Middle tarsi with first segment about twice longer than second and prolonged on inner side (fig. 96); hind tarsi with it slightly but distinctly longer and also prolonged, hind tarsi as long as hind tibiae, hind tibiae seemingly bent backward at apex and apex scarcely widened. Genitalia, including basal piece, about as in *barbarae* (fig. 219), but hairs inconspicuous.

SEXUAL DIMORPHISM: The type and other males have the first segments of the middle and hind tarsi as given above, these segments being truncate (and normal) in females. Females have the hind tarsi shorter than males and the first segment somewhat shorter and stouter. Other characters are as in *atramentaria*, except for the length of the fifth abdominal segment and the shape of the pygidium, which are not constant.

VARIATIONS FROM TYPE: The length in other specimens is from 7.5 to 9.5 mm.; the color is usually black, with the edges and suture dark red, in some specimens entirely red. In some specimens the clypeal margin is slightly emarginate between the dentiform angles; a weak furrow is present on the under side of the clypeus; there is a center crease on

the pronotum; in some there are only a few punctures (five or six) in the elytral costae; an indistinct groove may be present above the pygidium; the surface of the elytra is smooth, not rugose, in most specimens, but is usually opaque, not shining.

REMARKS: From above, this species might be mistaken for *tarsalis* (*puberea* group), which occurs in some of the same localities in Mexico as well as in the southwestern United States. That species, however, has no produced tarsal segments, but has hairy pads on the tarsi in both sexes. Not only does *exstans* have the spiny projection on the middle and hind first tarsal segments, but it has these segments very long, as stated in the description above. Actually the projection on the inner side of these segments is rather broad and is not so spine-like as it is in the males of the dorsally pubescent *spina* (*puberea* group) from Oaxaca, but about as in males of *sinuans* from Guerrero, a species with the clypeus not at all dentiform. The apically rather backward-bent hind tibiae of *exstans* are characteristic also of *sinuans* and *kuschei* and occur elsewhere in the genus in the pubescent species *tarascana* and *pilifera*.

The known distribution (fig. 87) seems to parallel that of *barbarae*, a species of this group that occasionally (in Oaxaca) also has the clypeus dentiform and even has the tarsal segments just perceptibly prolonged, but the first segment of the middle tarsi in *barbarae* is only slightly longer than the second, not, as in *exstans*, as long as the first and second combined. In addition *barbarae* differs by having the mentum in front strongly declivous, the declivity distinctly margined and prominent.

In one of the four specimens from Tehuantepec (a female), the sides of the abdomen are so sharply delimited as to be almost ridged, a tendency found in other species of the group.

***Diplotaxis sinuans* Vaurie, new species**

Figures 36, 96, 219

TYPE MATERIAL: Type, male, El Mogote, near Taxco, Guerrero, Mexico, 5000 feet, June 1, 1954, R. K. Selander, collector, and 27 male paratopotypes. Type and some paratypes in the American Museum of Natural History; other paratypes in the collections of the California Academy of Sciences; United

States National Museum; Instituto de Biología, Mexico City; Richard B. Selander; Rockefeller Foundation Agricultural Program, Mexico City.

DIAGNOSIS: This species, while similar in a number of respects to others of the group, is distinguished from them all by a combination of the three following characters: the broad clypeus with truncate front margin and rounded, never dentiform, angles; the "swirl" of the reflexed elytral margins which are as wide towards the apex as the outermost elytral interval; and the prolonged and widened inner apical angles of the first segments of the middle and hind tarsi of the males (fig. 96).

RANGE: Known only from the type locality in the northern section of the state of Guerrero, Mexico. Eleven female topotypes in the American Museum of Natural History have not been included in the paratype series.

DESCRIPTION OF TYPE, MALE: Length, 11 mm. Color dark red. Head and clypeus as given in description of lectotype of *atramentaria*, except that clypeal suture is visible at sides only and clypeus is one-half of the length of head. Antennae and mandibles as in *atramentaria*. Last segment of maxillary palpi flattened. Labrum and mentum as in *atramentaria*, except labrum faintly punctured and declivity of mentum in apical fourth.

Pronotum, scutellum, and elytra as in *atramentaria*, but front angles of pronotum only slightly acute and elytral surface opaque, without luster, costae with at least a dozen punctures, and reflexed elytral margins from first to apex of fourth segment as wide as outermost elytral interval. Abdomen and pygidium as in *atramentaria*. Pygidium flat, very large, almost square, sparsely punctured.

Front tibiae and hind femora as in *atramentaria*. Middle tarsi with first segment prolonged triangularly at inner apex, and twice as long as second segment. Hind tarsi with first segment only slightly longer than second, its inner apex also produced, and apex twice as wide as base; hind tarsi as long as hind tibiae. Setose carinae of hind tibiae not extending across face of tibiae, not prominent. Hind tibiae somewhat bent and scarcely widened at apex. Claws as in *atramentaria*. Genitalia as in *barbarae* (fig. 219), but hairs inconspicuous and lobes longer; basal piece shorter than lobes.

SEXUAL DIMORPHISM: The prolongation of the first segment of the middle and hind tarsi as given above is characteristic of males. Females have these segments about the same length as do the males but without projections (although a few females have a slight projection on the middle legs). Females have the hind tarsi shorter (not longer than hind tibiae) than do males, and they differ further from males by having the apex of the hind tibiae flared out. There is little difference between the sexes in respect to the fifth abdominal segment or the width of the hind femora. Females have the pygidium somewhat narrowed at apex.

VARIATIONS FROM TYPE: The length varies from 9 to 11 mm. The labrum in some specimens is slightly convex in front. The angles of the pronotum in most specimens are not acute. The pygidium in two of the paratypes is convex.

REMARKS: This species has the same prolonged tarsal segments in the male as *exstans* but is distinguished at once from that species by its broad reflexed elytral margins and non-dentiform clypeus. The clypeus and head are about the same as those of some *atramentaria* (and as in fig. 36 of *sparsa*), but the male character and the reflexed elytral margins differ.

***Diplotaxis kuschei* Vaurie, new species**

Figures 95, 215

TYPE MATERIAL: Type, male, Venodio [Venadillo], Sinaloa, Mexico, July 1, 1918, Kusche, collector, in the United States National Museum.

DIAGNOSIS: This species has larger eyes, longer labrum, larger and wider male genitalia, and longer projection of the basal tarsal segment of the hind legs than do any others of the group (fig. 95).

RANGE: Known only from the type locality which is about 30 miles north of Mazatlan in northwestern Mexico. J. A. Kusche evidently collected many insects at this locality, given on his labels variously as either "Venedio" or "Venodio," but no such name appears on the millionth map (American Geographical Society, 1945). According to Boyle (1956, p. 153) and to Vaurie (1958, p. 349), following Boyle, it is El Venadillo, 5 miles northeast of Mazatlan, but Venadillo on the millionth map is at least 30 miles north.

DESCRIPTION OF TYPE, MALE: Length, 8 mm. Color dark red. Head and suture as in description of lectotype of *atramentaria*, except no confluent punctures present. Clypeus without hairs, about one-half of the length of head, trapezoid, punctures somewhat sparser than those on head, front and side margins straight and of equal length, front well reflexed, angles obtuse but rounded. Eyes large, each eye distinctly one-quarter of the width of head. Antennae, palpi, mandibles, and mentum as in *atramentaria*. Labrum rather convex throughout, apparently impunctate, almost twice longer than under side of clypeus (the latter faintly furrowed), sides not prominent, front margin arcuate.

Pronotum as in *atramentaria* but appearing longer, less transverse. Scutellum densely punctured. Elytra (surface shining) two and one-half times longer than pronotum, punctures about twice as large as those of pronotum and dense, some punctures elongated and confluent; second interval multipunctate (double row); costae convex, impunctate; marginal hairs as long as sutural interval is wide; reflexed elytral margins narrow from middle to apex. Abdomen, pygidium, propygidium, front tibiae as in *atramentaria*. Hind femora distinctly narrower than second abdominal segment is long. Middle and hind tarsi with first segments distinctly longer than second and prolonged on inner side, ending in small spine; hind tarsi with all but first two segments missing; hind tibiae bent back at apex, very hairy, apex scarcely flared out, setose carinae not extending across face of tibiae. Claws as in *atramentaria*, but inner claw on front tarsi more gently curved, less angularly bent. Genitalia as in figure 215; basal piece as long as lobes.

REMARKS: This species, known so far only from the type, has elytra like those in some *commixta*, the prolonged first segments of the middle and hind tarsi like those in *exstans* and *sinuans*, the elongate pronotum like that in *mexcala* or *exstans*, and the clypeus like that in *barbarae* or some *atramentaria*. The projection of the first hind tarsal segment is more oblique (fig. 95) than it is in *exstans*, but the eyes (larger), labrum (longer, impunctate), mentum (advanced, not flat), clypeus (not dentiform), and male genitalia (figs. 215, 219) differ.

The only other record of the group from Sinaloa is a female of *commixta* from Mazatlan.

The species is named for the collector, J. August Kusche, who discovered some interesting material in beetles, especially in Sinaloa, and who added many specimens to the local collections in California.

***Diplotaxis tzitzio* Vaurie, new species**

Figure 216

TYPE MATERIAL: Type, male, 12 miles south of Tzitzio, on Huetamo Road, Michoacan, Mexico, latitude 19° 20' N., longitude 100° 50' W., July 9, 1947, 1050 meters, T. H. Hubbell, collector, in the Museum of Zoology, University of Michigan. Five male paratopotypes in the University of Michigan and the American Museum of Natural History.

DIAGNOSIS: This species has the clypeus dentiform as in *exstans* and *commixta*, but differs from the former by having a shorter pronotum with obtuse front angles, and by not having prolonged tarsal segments in the male; from the latter by having the hind femora and the elytral costae with more numerous punctures, and different male genitalia.

RANGE: Known only from the type locality in northeastern Michoacan, western Mexico. The village of Tzitzio is east of Morelia on the road leading south to Huetamo. In addition to the paratypes, a female (with the same data) has been examined.

DESCRIPTION OF TYPE, MALE: Length, 10 mm. Color dark red. Head and clypeal suture as in description of lectotype of *atramentaria*, except having no confluent punctures. Clypeus without hairs, punctures slightly smaller and denser than those on head, nearly one-third of the length of head, front margin scarcely reflexed, slightly emarginate between dentiform angles, side margins outwardly sinuate. Each eye about one-fifth of the width of head. Antennae, palpi, mandibles, labrum, and mentum as in *atramentaria*, except front margin of labrum scarcely arcuate and declivity of mentum in apical fourth.

Pronotum transverse, punctures of disc smaller and much sparser than those on head, sides widest at middle, thence evenly and

strongly cut back to obtuse front and hind angles. Elytra (surface moderately shining) at least three times longer than pronotum, punctures twice as large as those on pronotum; second interval with two rows of punctures; costae convex, with about a dozen irregularly spaced punctures (only six on disc); marginal hairs shorter than width of a sutural interval; reflexed margins narrow from middle to apex. Scutellum and propygidium as in *atramentaria*. Pygidium convex, with large touching punctures. Legs and claws as in *atramentaria*, except hind tarsi are as long as hind tibiae. Abdomen with sides of first two segments sharply delimited, but not ridged. Genitalia, including basal piece, as in *atramentaria* (fig. 216).

SEXUAL DIMORPHISM: As given for *atramentaria*.

VARIATIONS FROM TYPE: The length of other specimens varies from 8.5 to 10 mm. In a couple of individuals the clypeus is as long as one-half of the length of the head, and there are fewer than 12 punctures on the elytral costae. The palpi have a flattened area. In some specimens the punctures of the pronotum are larger and coarser, and the sides of the pronotum are widest behind the middle.

REMARKS: In addition to the two species mentioned in the diagnosis, two other species of the group have the clypeus dentiform in some, but not all, specimens, and *tzitzio* differs from them as follows: from *barbarae* (a few individuals from Oaxaca have a dentiform clypeus) by having the elytral costae convex and shining, not flat and opaque, the pronotum and tarsal claws proportionately shorter, and the punctures of the elytra distinctly larger than those on the pronotum; from *commixta* (some specimens from Nuevo Leon, Hidalgo, Guerrero, and Oaxaca) by having the front angles of the pronotum obtuse, not drawn forward to a needle-like point, and the elytral intervals with more space between the punctures, the elytral costae with at least five, if not more than five, discal punctures.

The male genitalia of this species (three specimens dissected) are similar to those of *atramentaria*, a more widespread species with somewhat the same pronotum also, but which has rounded or obtuse, not dentiform, angles on the front of the clypeus, and many more and smaller punctures in the second interval

of the elytra, the surface of the elytra opaque, not shining.

If these seven specimens should be considered as variants of some other member of the group, it could only be of *atramentaria*, which would mean that *atramentaria*, as does *barbarae*, has the clypeus dentiform in some geographical areas. (See discussion of group.)

***Diplotaxis commixta* Vaurie, new species**

Figures 88, 89, 216

TYPE MATERIAL: Type, male, Acapulco, Guerrero, Mexico, June 24, 1941, R. W. L. Potts, collector, and two female paratopotypes in the California Academy of Sciences. Seven other paratypes as follows: one female, Acapulco, July 1, 1951, P. D. Hurd, Jr., collector, in the University of California, Berkeley; two males and two females, Armeria, Colima, July 21, 1953, David Rockefeller Mexican expedition, C. and P. Vaurie, collectors, and one male, Manzanillo, Colima, July 18, 1953, same collectors, in the American Museum of Natural History; one female, Vulcano, Colima, L. Conrad, collector, in the United States National Museum.

DIAGNOSIS: This species (fig. 88) differs from others of the group by having the front angles of the pronotum much farther drawn forward and almost needle-sharp, the sides of the pronotum more bulging at the base and distinctly sinuate to the front angles. It differs from all but the small black *mexcala* in its more shining, not opaque, elytra, with very large punctures and virtually impunctate elytral costae. (See below for comparison with *mexcala*.)

RANGE: The west coast of Mexico from southern Sonora south to Chiapas, and inland in Michoacan, Hidalgo, and Nuevo Leon (Monterrey) (fig. 89). Twenty-five additional

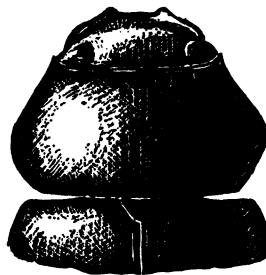


FIG. 88. Type of *Diplotaxis commixta*.

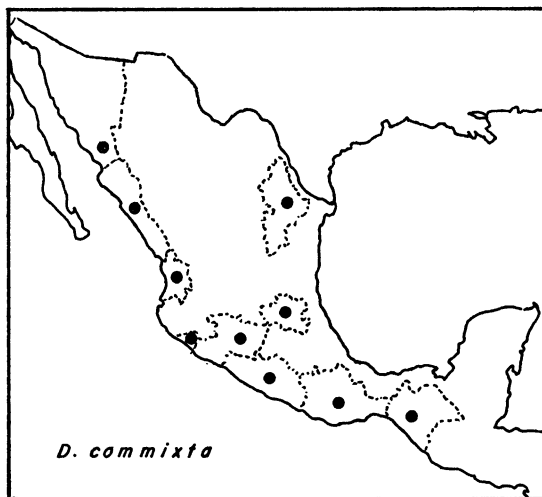


FIG. 89. Discontinuous distribution of *Diplotaxis commixta*.

specimens, not paratypes, have been examined from various states (see Appendix).

DESCRIPTION OF TYPE, MALE: Length, 8.5 mm. Color dark red. Head and clypeus equally coarsely and densely punctured, clypeal suture obliterated at middle. Clypeus with a few minute hairs behind margin, one-half of the length of head, front margin truncate between bluntly dentiform angles, side margins outwardly sinuate, margins reflexed only by width of margin. Eyes large, each eye nearly one-quarter of the width of head. Antennae, maxillary palpi, mandibles, labrum, and mentum as in lectotype of *atramentaria*.

Pronotum transverse, punctures of disc sparse and smaller than those of head, sides strongly margined and slightly raised apically, bulging and arcuate behind middle, thence curved back to obtuse hind angles, and sinuate to acute and strongly produced front angles. Scutellum with three punctures. Elytra (surface shining) nearly three times longer than pronotum, punctures twice as large as those on pronotum and dense; second interval at base with a single row of punctures which fills interval at middle with a double row; costae flat but elevated, virtually impunctate (three to seven punctures present behind middle on inner discal costae, none on disc and none on disc of other costae); reflexed elytral margins narrowed

from middle to apex; marginal hairs, propygidium, and abdomen as in *atramentaria*. Pygidium with large (as on elytra), dense punctures. Legs and claws as in *atramentaria*, except for length of hind tarsi which equals that of hind tibiae. Genitalia somewhat as in figure 216 of *atramentaria*, except for more widened and stouter apices and sinuate profile; basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *atramentaria*.

VARIATIONS FROM TYPE: The length of other specimens ranges from 7 to 10 mm. The head has an impunctate transverse area behind the clypeus in some specimens (five from Tuxtla Gutierrez, Chiapas, two of five from Oaxaca, three of the six paratypes from Colima), and the clypeal suture is visible in one of five specimens from Michoacan and two paratypes from Colima. The clypeus is shorter or has the front margin slightly emarginate instead of truncate in a few specimens. The only specimens with the clypeus dentiform as in the type are the two from Hidalgo, one from Nuevo Leon, one from Oaxaca, three of the paratypes from Guerrero, and two of the six specimens from Michoacan. All the others have the clypeus either with rounded angles or with vaguely incipient teeth represented by an angulation; the sides of the clypeus straight, not sinuate, in many specimens; the five specimens from Tuxtla Gutierrez with the front margin more reflexed than that of the type. Some individuals have the eyes smaller; some have the punctures of the pronotum much more sparse. Punctures of the scutellum are very variable. The punctuation of the second elytral interval varies also, from a double row of punctures at the middle and a single row at each end (as in the type and some of the paratypes and other specimens) to a single row throughout (some paratypes from Colima), or double and triple rows of smaller punctures throughout (all the specimens from Michoacan). In some the costae have virtually no punctures. The genitalia of two of the three males from Michoacan (Tuxpan and Tzitzio) seem to differ by having the lobes sinuate in profile and (in profile or viewed head on) the apices much wider, but the third male (Tuxpan) has the lobes like those in the type. (See below for further remarks on Michoacan.)

REMARKS: It can be seen from the varia-

tions given above that this species is not homogeneous, and there is even the possibility that more than one species is involved. Certainly the geographical distribution (fig. 89) is rather unusual for members of this genus which do not generally occur in both the eastern and western parts of Mexico (except in the far south), although some of the *trapezifera* group do so. The single individual from Nuevo Leon in northeastern Mexico, however, is almost identical with the type and paratypes from Guerrero in the southwest. In fact, the population from Michoacan, just north of Guerrero, differs more from the type series (Guerrero and Colima) than do the individuals from Nuevo Leon and Hidalgo in the east. These specimens from Michoacan (two males from Tuxpan, one male and three females from nearby Tzitzio) differ from those of the other populations by having two or three closely packed rows of punctures in the second elytral interval even at the base, the reflexed elytral rim wider (almost "swirling") from the middle to the apex, and, in males, slightly different genitalia. These specimens, however, differ also among themselves, the two males from Tuxpan having the abdomen so thickened along the sides that it could be called "ridged laterally," and one of the Tuxpan males and the three females lacking the clypeal teeth (worn, perhaps). However, other specimens also may lack the teeth on the clypeus, or have the abdomen rather sharply edged laterally, and the genitalia of one of the Tuxpan males seems intermediate in shape between those of typical *commixta* and those of the other males from Michoacan. Ten males were dissected.

This species differs from *mexcala* by not being black and by having different male genitalia (the lobes not acuminate at the apex and not curved), the pronotum proportionately shorter and without the flattened depression at the middle base, the declivity of the mentum prominently advanced, not flat, and the clypeus dentiform (except when worn).

***Diplotaxis mexcala* Vaurie, new species**

Figure 212

TYPE MATERIAL: Type, male, Mexcala, Guerrero, Mexico, July 9, 1955, "at light,"

R. B. and J. Selander, collectors, and 20 male paratopotypes; also two male paratypes with same data except for the date which is July 17, 1957. Type and some paratypes in the American Museum of Natural History. Other paratypes in the collection of the University of Michigan; California Academy of Sciences; United States National Museum; Instituto de Biología, Mexico City; Richard B. Selander; Rockefeller Foundation Agricultural Program, Mexico City.

DIAGNOSIS: The smallest and darkest of the group, this species has proportionately the longest pronotum (nearly as long as one-half of the elytra), with a characteristic slight impression at the middle base in front of the scutellum. The clypeus is not dentiform; the male has no prolonged tarsal segments; the lobes of the male genitalia differ by being more acuminate at the apex and (in profile view) curved, not straight (fig. 212).

RANGE: Known only from the type locality in northern Guerrero between Iguala and Chilpancingo. Eleven females with the same data as the type have also been examined.

DESCRIPTION OF TYPE, MALE: Length, 7.5 mm. Color black. Head descending abruptly to clypeal suture which is obliterated; head and clypeus equally finely and densely punctured, except for irregular small impunctate areas just behind clypeus. Clypeus as in lectotype of *atramentaria* but longer, about one-half of the length of head. Each eye nearly one-fourth of the width of head. Antennae, palpi, mandibles, labrum, and mentum as in *atramentaria*, except neither labrum nor declivity of mentum advanced prominently.

Pronotum as in *atramentaria* but appearing longer, less transverse, punctures only moderately sparse, and base rather depressed in area in front of scutellum. Scutellum densely punctured basally. Elytra (surface shining) only slightly more than twice longer than pronotum, punctures dense, twice larger than those of pronotum; second interval with single row of punctures filling interval, and punctures as large as punctures of striae; costae convex, with four or five punctures on disc of each inner costa, two on other discal costae; marginal hairs sparse, as long as sutural interval is wide; reflexed margins narrow from middle to apex. Pygidium punctured densely. Abdomen, propygidium, legs,

and claws as in *atramentaria*, except for hind tarsi which are as long as hind tibiae. Genitalia as in figure 212; basal piece shorter than lobes.

SEXUAL DIMORPHISM: Although the sexual differences are about as stated for *atramentaria*, the sexes are rather difficult to distinguish, because these differences are very slight and not always reliable. Thus some males have the hind tibial spurs almost as wide as those of females, and some females have the fifth abdominal segment shorter than the fourth as in males.

VARIATIONS FROM TYPE: The length of other specimens ranges from 7 to 8 mm. Only two of 34 individuals are entirely reddish, although some have reddish areas (such as the clypeus, sides of pronotum, or elytral suture); in some the elytra have a greenish sheen. A few specimens have no impunctate area behind the clypeus and the front margin of the clypeus slightly emarginate. The scutellum may be punctured more densely than the type, or less densely. In some males the hind tarsi seem scarcely as long as the tibiae. A few of the paratypes have no punctures visible on the costae of the elytra; the punctures of the second interval are double at the middle in some individuals.

REMARKS: Except for the secondary sexual variation, this species appears quite homogeneous, perhaps because all the specimens seen are from the same locality. Even the eighth sternite (dissected in seven specimens) is constant in shape (with an elongate narrow projection). The pronotum is the same shape as that of *exstans*, not so exaggerated as in *commixta*; the elytra, on the other hand, resemble those of *commixta*, though are proportionately shorter.

SPECIES GROUP *RESIDUA*

Only two species are placed in this group. Perhaps Fall is correct (1909, pp. 35, 36) and they are closely allied to *conformis marginicollis* group) and *mentalis* (*brevicollis* group), but they can just as well, I believe, be placed in a group by themselves. They are characterized by having a very short, not advanced, labrum, medium-sized mandibles, short oval elytra, being of small size, having acuminate and horizontal apices of the lobes

of the male genitalia, and northern distribution (northwestern United States and southwestern Canada). The furrow of the under side of the clypeus characteristic of the *brevicollis* group is lacking in *residua*, and the labrum is punctured in *tenebrosa* (not so in the *brevicollis* group). The front margin of the clypeus in some specimens is so faintly emarginate that the clypeus might be considered as rounded from side to side as in the *frondicola* group. Most of the species of the latter group are more southern in distribution, but a few might be confused with *residua* or *tenebrosa* (see the species).

About 42 specimens have been examined, including the type of *tenebrosa*. All the characters are given under *residua*, with which *tenebrosa* is compared. Habitat notes are given for *tenebrosa*.

Diplotaxis residua Fall

Figure 144

Diplotaxis residua FALL, 1909, p. 34 (Idaho; type in the Academy of Natural Sciences of Philadelphia).

DIAGNOSIS: Similar in many details to *tenebrosa*, but differs by having short wings and short metasternum, medially cleft claws, sparsely punctured pronotum, punctured labrum, more uniformly punctured elytra, with the second interval unipunctate, not multipunctate, longer marginal hairs, and the front tibiae with the basal tooth median. The pygidium is broadly rugose in such a way that the punctures are virtually invisible.

RANGE: Known from Idaho only. Specimens examined from this state include: one female, May, from Springfield; two males, one female, from Blackfoot; one male, one female, from Moscow; one male, April, from 9 miles east of Malta.

DESCRIPTION: Length, 8.5 to 9 mm. Color tawny. Wings reduced, not long enough to fold under, reaching to fourth segment of abdomen. Head sloping gently to clypeus, without interruption at clypeal suture which is obliterated at middle. Head and clypeus uniformly finely and densely punctured, clypeus one-half or more than half of the length of head, front margin slightly emarginate at middle, thence rounded to sides, apical third strongly reflexed; sides not sinuate, canthi not

prominent. Eyes not sunk, flattened on sides, below not reaching to gular region, each eye about one-sixth or one-seventh of the width of head. Antennae 10-segmented, club no longer than funicle. Mandibles not especially large. Maxillary palpi with flattened spot at base of last segment. Labrum shallowly concave, faintly, if at all, punctured, same length as or slightly shorter than and level with the reflexed under side of clypeus, the latter not furrowed, or but slightly so in one or two specimens, front margin of labrum scarcely curved. Mentum rather flat behind, but declivous in apical third or fourth, declivity flat, its posterior edge pubescent, sharp, but not margined.

Pronotum twice as wide as long, convex, punctures of disc of same size as those of head but sparse, sides strongly margined, widest at middle, evenly, strongly arcuate to obtuse front and hind angles, front angles not truly depressed within. Scutellum impunctate in four of five specimens. Elytra three times longer than pronotum, punctures larger and sparser than those of pronotum, those of costae and suture shallow and indistinct; second interval with a single row of large punctures (as large as those of striae); costae flat or convex, with single row of small punctures; humeral callosities present but weak, subapical callosities obsolete; marginal hairs at middle as long as scutellum; epipleurae narrowing to apex in some specimens. Metasternum between coxae same length as second abdominal segment. Hind coxal plate with sides truncate, only slightly angulate in front. Pygidium with vague irregular impressions instead of distinct punctures. Propygidium grooved; spiracles not prominent.

Front tibiae with third or basal tooth more distant from second than second from apical, apex of third tooth at middle of tibiae. Hind femora no wider than length of second abdominal segment, slightly emarginate at apex. Middle tarsi with first segment slightly longer than second, hind tarsi with it shorter than second, hind tarsi as long as hind tibiae. Claws gently curved, ungual tooth submedian, slightly in front of middle in some specimens, shorter and thinner than, and distant from, apex of claw. Male genitalia as in figures 144 and 145 of *confusa*, but apices in dorsal view acuminate and in profile not

turned down; basal piece about equal in length to lobes.

SEXUAL DIMORPHISM: Males have the pygidium transverse, females have it more equal-sided; males have the first hind tarsal segment elongate and narrow and as long as the longer tibial spur, whereas females have it widened at the apex and shorter than the spur. Females have wider hind femora. Fourth segment of abdomen scarcely shorter in males than in females.

REMARKS: This species must be quite rare, as I have seen only seven specimens. Fall does not mention the short wings, but he noticed that the antennae of his single specimen were "seemingly 9-jointed, the fifth and sixth joints being completely united," and he thought this might well be accidental because it was present on one side only. I have not seen the type, but on at least four of the specimens examined, the antennae appear to have two segments united without any clear-cut division.

Fall considered *residua* closely related to *conformis*. He placed it in his classification near that species and near *tenebrosa* and *mentalis* because of their broadly convex or subconvex mentum. It is true that *tenebrosa* and *residua* have no ridge on the mentum, but the mental declivity appears, nonetheless, to have a sharp edge posteriorly, not so rounded off as that in *conformis* and *mentalis*. Although *tenebrosa* (see diagnosis above) has a different pronotum and elytral punctuation, and different claws, Fall himself (1909, p. 35) confused it with *residua*, making a specimen of *tenebrosa* from British Columbia, which I have examined, a paratype of *residua*.

The head, eyes, clypeus, tibiae, claws, and even the labrum, are almost identical with those of another flightless species, *macronycha* from Arizona (*connata* group), from which *residua* differs by having the pronotum very short (one-third of the length of the elytra), its sides evenly arcuate, not cut back to the base, the humerus of the elytra distinct, the metasternum and inner wings longer (the latter reaching to the fourth segment of the abdomen), the pygidium with shallow, scarcely impressed punctures, and the color tawny, not black.

This species is also similar in a number of respects to *pacata* of the *frondicola* group

(Nevada, southern California, and elsewhere, but not Idaho), but differs from it in the genitalia of the male (figs. 144, 200), by having the declivity of the mentum less distinct and without any margined edge at rear, and the apices of the elytra rounded off (because of the near-apterous condition), not with subapical callosities.

***Diplotaxis tenebrosa* Fall**

Figure 144

Diplotaxis tenebrosa FALL, 1909, p. 35, pl. 1, fig. 10 (Helena, Montana; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: In its short, convex pronotum and short, oval elytra, this rather small species resembles both *residua* (Idaho) and some individuals of *obscura* (those with short wings). It differs from the former, as stated in the diagnosis of that species, and from *obscura* by having the clypeus longer and its front edge more reflexed; the labrum shorter than the reflexed under side of the clypeus; the front edge of the labrum virtually truncate, not arcuate as in *obscura*; and the lobes of the male genitalia acuminate, not rounded off and turned down.

RANGE: British Columbia, Canada, south to northern California and Nevada, also Montana; Essig (1958, p. 442) gives also Utah. One female has been examined from "Arizona," and Fall (1909) mentions one example from Nebraska in the Bowditch collection. These last two localities need confirmation. Approximately 35 specimens have been examined (see Appendix).

HABITAT: In British Columbia, this species has been observed (Essig, 1958, p. 442) "to injure young apricot seedlings" and to have caused (MacNay, 1958) "at least on occasion, . . . appreciable damage" to both apricot and apple crops.

DESCRIPTION: Length, 8.5 to 10 mm. Color black, pronotum dark red in some specimens. Agrees with description of *residua*, except as follows: wings of full length; canthi angulate in some specimens; labrum scarcely concave, densely, rugosely punctured, shorter than and level with the contiguous part of the reflexed under side of clypeus (other half of under side of clypeus at an angle and not on same plane as part near labrum), front margin virtually

truncate; pronotum with punctures of disc larger than those of head and not quite so dense, front angles slightly depressed within and slightly produced forward; elytra with punctures rather rugose in some specimens, punctures of second interval in two rows, surface rather opaque, all callosities present, marginal hairs no longer than width of a sutural interval; metasternum about one and one-half times longer than second abdominal segment; pygidium with large dense punctures; front tibiae with apex of basal tooth in most specimens in front of middle; hind femora as wide as or wider than length of second abdominal segment, and distinctly emarginate at apex; claws toothed in front of middle, tooth shorter but thicker than apex of claw. Male genitalia as in *residua*.

SEXUAL DIMORPHISM: As in *residua*, except that some females have the pygidium as transverse as do the males, and some males have the first hind tarsal segment rather short, as in females.

REMARKS: Although Essig (1958) calls this a "common," and Fall (1909, p. 36) a "fairly common," species in the northwest, I have seen only 35 specimens. At first glance, because of its rounded and convex appearance, one might suspect that *tenebrosa* has short wings, but this is not true of the examples dissected, and, on closer inspection, one finds that the elytral callosities are well marked and that the metasternum is longer than the second abdominal segment (characteristics of fully winged species). Except for the Arizona and Nebraska specimens mentioned above (which may have been misidentified or mislabeled), this appears to be strictly a northern species.

SPECIES GROUP *PUNCTULATA*

The two large species of this group (*punctulata* Horn and *microchele*, new species) resemble the species of the *brevicollis-haydenii* group by having a furrow, though weak, on the under side of the clypeus, but differ from them by having larger eyes, the labrum distinctly punctured, the mandibles (though long) rather flat, not bulbous, and the groove behind the pygidium indistinct or lacking.

Only 27 examples have been examined. The geographical range is Baja California for *punctulata* and southern and central Mexico

for *microchele*. All characters are given for *punctulata*, with which *microchele* is compared.

***Diplotaxis punctulata* Horn**

Figures 44, 222, 223

Diplotaxis punctulata HORN, 1894, p. 397 ("San Jose del Cabo, Coral de Piedra, Sierra El Taste"; lectotype, female, Sierra El Taste [Baja California, Mexico], here designated from two of the original syntypes in the California Academy of Sciences).

DIAGNOSIS: This species resembles *aequalis*, *sierrae*, and some of the other species of the *brevicollis* group but differs notably by having much larger eyes. Its large size, minute secondary punctures of the elytra, non-bilobed labrum, and non-hairy clypeal disc distinguish it from any other species of Baja California. The hind femora at center are impunctate. (See *microchele* for comparison with that species.)

RANGE: Southern half of Baja California, mainly in the Cape region, but extending north to Comondú. (See Appendix for data on the 23 specimens examined; also fig. 44.)

DESCRIPTION OF LECTOTYPE, FEMALE: Length, 15.5 mm. Color black. Head scarcely sloping to clypeus (nearly flat), finely, very densely punctured on slightly uneven surface. Clypeal suture obliterated at middle. Clypeus a little longer than one-half of the length of head, densely punctured as on head, front margin very slightly emarginate and but slightly reflexed between broadly rounded angles, sides converging obliquely, not sinuate. Each eye about one-quarter of the width of head. (For antennae and mandibles, see variations below.) Palpi of lectotype with last segment hidden (deeply impressed in other specimens). Labrum one and one-half times longer than and advanced from the reflexed under side of clypeus, longer at middle than at sides, concave behind, finely punctured, front margin angulate. Mentum with sharp declivity in apical fourth, which has its surface flat and its posterior edge strongly margined, pubescent, and scarcely curved.

Pronotum rather flat, longer than head and clypeus combined, punctures of disc same size as those on head, but sparser; on sides more dense, sides widest at middle, scarcely arcuate to obtuse front angles and to right-

angled, downward-bent hind angles, sides furrowed within their margins, especially towards base, sides at base nearly parallel; pronotum with an impressed line at center, and laterally in front with a transverse impression on each side. Elytra two and one-half times longer than pronotum, punctures larger, not denser; second interval multipunctate (two and three rows), costae flat, with sparser punctures; marginal hairs in front as long as scutellum, elsewhere longer than the width of a sutural interval; suture with a double irregular row of punctures; surface filled with minute punctulations among the large punctures; reflexed elytral margins wide from hind coxae to third abdominal segment, then narrower to apex. Metasternum twice as long as first abdominal segment. Hind coxal plate angulate at sides, the angle elevated and fitting over edge of elytral margin. Pygidium confluent, finely, densely punctured. (For propygidium, see variations below.)

Front tibiae with third tooth in front of middle. Hind femora wider than second abdominal segment is long (femora smooth, scarcely punctured). Middle tarsi with first segment slightly longer than second, hind tarsi with it slightly shorter than second, hind tarsi as long as tibiae. Claws elongate, longer than half of claw segment, angularly bent and cleft subapically, tooth as long as apex of claw.

SEXUAL DIMORPHISM: The lectotype and other females have the longer spur of the hind tibiae longer than the first hind tarsal segment, whereas males have it the same length. On the middle tarsi, the first segment in males is twice as long as the spur. Females have wider hind femora. The pygidium is scarcely less transverse in females; the fifth abdominal segment is as long as the fourth, not shorter as in males. The genitalia of the males are about as shown in figures 222 and 223 of *brevicollis*, except for the inner edges of the lobes, which are joined nearer the base than shown, and the lobes, which are much narrower in profile; basal piece shorter than lobes.

VARIATIONS FROM LECTOTYPE: The length varies from 13 to 17 mm. Some specimens are dark red; some have the clypeal suture impressed at the middle, or the clypeal front margin more emarginate or more reflexed;

some have confluent punctures on the head and clypeus; some have the basal tooth of the front tibiae very small; most specimens have the labrum arcuate, not angulate, in front; some have a furrow in the center of the pygidium. The crease and impressions on the pronotum are not present in all specimens; the elytra in some are exceedingly rugose.

Characters not noted at the time of examination of the lectotype are given here for other specimens: antennae 10-segmented, club as long as funicle; mandibles large, not bulbous; under side of clypeus weakly furrowed; scutellum punctured along sides; propygidium with groove indistinct or absent, spiracles not especially prominent.

REMARKS: This species and *magna* are probably the largest in the genus. The minute secondary punctuation or punctulation of the elytra, for which this species was named, is present, as noted by Fall (1909, p. 70), in some other species as well, but not so noticeably as in *punctulata*. The crease on the pronotum and the side impressions near the front of the pronotum occur also in *aequalis* (Arizona). Many of the other large species differ from *punctulata* by having the front angles of the pronotum impressed and acute.

Horn is probably correct in stating that this species should be associated with "*tristis* and allied forms" (which I call the *brevicollis-haydenii* group), but I have not put it with them because of its larger eyes and lack of distinct furrow under the clypeus. Horn (*loc. cit.*) placed it between *trementina* (my *frondicola* group) and *peninsularis*, the latter being a form with cleft labrum that I place in the *moerens* group.

I wish to thank Mr. Hugh B. Leech of the California Academy of Sciences in San Francisco for the opportunity to inspect two of Horn's original specimens, from San Jose del Cabo and Sierra El Taste. The specimen from El Taste was chosen as the lectotype, because the other specimen lacks both hind tarsi. Horn gave still a third locality, Coral de Piedra [Corral de Piedra], at the time of his description, but this I have been unable to find on the map of Hispanic America (American Geographic Society, 1945), which records places of this name in seven other Mexican states, but not in Baja California.

Diploaxis microchele Vaurie, new species

Figures 91, 217, 218

TYPE MATERIAL: Type, male, Cuerna Vaca [Cuernavaca, Morelos], Mexico, July 2, 1939, M. A. Embury, collector, in the American Museum of Natural History. Three female paratypes from Mexico, two from Acapulco, Guerrero, July 1, 1951, P. D. Hurd, Jr. collector, in the collection of the University of California, Berkeley, and one from 1.5 miles northeast of Los Amates, Chiapas, March 17, 1954, 2600 feet, Selander [R. K.], collector, in the American Museum of Natural History.

DIAGNOSIS: Three features characterize this species: the very tiny claws (no longer than one-third of the length of the claw segment); the bending down and under of the hind angles of the pronotum, the area within the angle opening onto a long impression or furrow extending along the side margins of the pronotum (fig. 91); the contrast between the fine, sparse, and shallow punctures of the pronotum and the large, deeply impressed punctures of the shining elytra, the latter with the punctures of the second interval in two distinct and uniform rows.

RANGE: Chiapas and Guerrero on the Pacific coast of southern Mexico inland to the state of Morelos.

HABITAT: The paratype from Los Amates, Chiapas, has the notation "pine-oak forest."

DESCRIPTION OF TYPE, MALE: (Comparisons are with the description of the lectotype of *punctulata*). Length, 12.5 mm. Color black. Head finely and densely punctured in front, sparsely on top, gently sloping to clypeal suture which is obliterated at the middle. Clypeus as in lectotype of *punctulata*, except punctures denser than those of head. Eyes as in *punctulata* or perhaps slightly smaller. Antennae missing in type (in paratypes 10-segmented, with club as long as funicle). Mandibles as long as labrum but flat, not bulbous. Maxillary palpi with last segment flattened in basal two-thirds. Labrum slightly longer than and about at a level with under side of clypeus, the latter weakly furrowed, labrum same length throughout, flat, finely and densely punctured, front margin gently arcuate. Mentum as in *punctulata*.

Pronotum convex, longer than head and clypeus combined, punctures of disc smaller, sparser, and shallower than those of head, sides widest behind middle, thence strongly arcuate to right-angled front and hind angles, sides abruptly constricted before hind angles which are sharp and bent downward (fig. 91), sides deeply furrowed along margin, especially at base and apex. Scutellum with a few basal punctures. Elytra as in *punctulata*, except punctures several times larger (also denser) than those of pronotum, second interval with punctures in two distinct rows, costae rather convex, surface not punctulate, epipleurae narrow throughout. Metasternum and hind coxal plate as in *punctulata*. Pygidium with large, deep, rather dense or confluent punctures. Propygidium not grooved, spiracles not prominent.

Front tibiae and middle and hind tarsi as in *punctulata*. Hind femora punctate at middle, narrower than first abdominal segment is long. Claws tiny, no longer than one-third of the length of claw segment, bent abruptly and cleft apically, tooth as long as and wider than claw apex. Genitalia as in figures 217 and 218; basal piece lost.

SEXUAL DIMORPHISM: As in *punctulata*, except the fifth abdominal segment of the male (type) appears as long as that of females, and the first segment of the middle tarsi in the male is only slightly longer than the longer spur. Females have much more abrupt and wider apical flare to the hind tibiae, and the hind femora wider than the first segment of the abdomen is long.

VARIATIONS FROM TYPE: The length of the paratypes is from 12 to 13.5 mm. The specimen from Chiapas is reddish, not black, and it and one of the other paratypes have a slight "frown" on the head behind the clypeal suture. Two of the paratypes have the last segment of the palpi deeply impressed.

REMARKS: This is one of the few large glabrous species in southern Mexico, the great majority of large species (except for some hairy ones) occurring farther north in Mexico or in the United States. The distribution seems rather discontinuous, but the material examined is more uniform than that of some geographically more restricted forms.

The specimen from Chiapas is as large as

some specimens of *punctulata* (Baja California) of this group and was at first glance thought to be that species, but it differs from *punctulata*, as do also the other specimens, by having the labrum flat, not concave, and shorter; the elytra not punctulate between the punctures; the sides of the pronotum curved, not nearly straight (both species have the sides impressed within the lateral margins), the hind angles bent under; the hind femora punctured at center, not impunctate; and the tarsal claws much shorter.

SPECIES GROUP *SUBCOSTATA*

The four species of this group, *Diplotaxis subcostata* Blanchard, *rufa* Linell, *languida* LeConte, and *bidentata* LeConte, have distinctive legs which are not, however, unique, but which do not occur, as stated below, in any of the other groups. The front tibiae (fig. 90) are deeply serrated, the teeth, especially the apical tooth or projection, being very long, and the third (or basal) tooth represented at most by a small angulation at or behind the middle of the tibiae. As to the hind legs, the femora are stout, short, and bulbous (fig. 99), wider in both sexes (except in *bidentata*) than the length of the second abdominal segment; the hind tibiae are proportionately broader than in most species and have the setose carinae near the apex and usually oblique (fig. 99); the apical spurs of the hind tibiae (except in *bidentata*) are very long, curved at the apex, bicolored (with transparent tip), and not appreciably differing between the sexes, as is usual in the genus (although in the *trapezifera* group also the spurs are not different sexually).

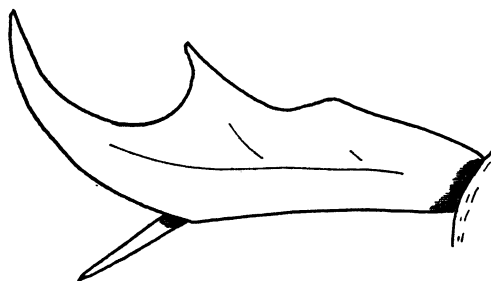


FIG. 90. Right front tibia of *Diplotaxis subcostata*, showing long apical projection and subobsolete third tooth.

Some other characters are as follows: The labrum is very long and the mandibles large and bulbous in *subcostata* and *bidentata*, but the two other species have the labrum no longer than the under side of the clypeus and the mandibles small and thin. The clypeus in front is emarginate in *subcostata*, squared off in *rufa*, and rounded from side to side in the two other species. The eyes are moderately well separated in all. The antennae have only nine segments in *languida*. The claws are apically cleft and bent in all.

The two species with rounded clypeus might be placed in the *frondicola* group, in which they are rather similar to both *punctatorugosa* and *brevisetosa* (they appear in the key to that group), or perhaps the two latter forms should be placed here. *Diploaxis subcostata*, because of a slight furrow under the clypeus, could almost be placed with the species of the *brevicollis* group (labrum and legs differ, however).

Nearly 900 specimens have been examined, including the types of all the forms except *subcostata* Blanchard; most of the material (600 specimens) is of *bidentata*. The species are compared with *subcostata*. Notes on habitat are given for all species except *rufa*.

DISTRIBUTION OF THE SPECIES

These species are restricted in the United States to the Atlantic coast (not north of New Jersey) and the Gulf coast (not west of the Mississippi River except possibly *subcostata*), *rufa* and *languida* being virtually endemic to Florida.

KEY TO THE SPECIES OF THE *subcostata* GROUP

1. Base of elytra near humerus distinctly impressed; head behind clypeus transversely carinate (carina may be interrupted at middle) *punctatorugosa*¹
Base of elytra either convex or vaguely flattened; head flat or convex or weakly tumid 2
2. Pronotal sides evenly arcuate, not sinuate; elytra ovate, convex, with second interval usually unipunctate and costae impunctate *bidentata*
Pronotal sides sinuate at base and/or apex; elytra elongate, flat, with second interval usually multipunctate and costae moderately or densely punctate 3

¹ The species *punctatorugosa* belongs in the *frondicola* group.

3. Prosternal process bicarinate 4
Prosternal process unicarinate 5
4. Large (9 to 13 mm.); dark red to black; antennae 10-segmented; mandibles bulbous, as long as labrum *subcostata*
Small (5.5 to 7.5 mm.); pale yellow; antennae nine-segmented; mandibles small and thin *languida* in part
5. Clypeus glabrous, rounded from side to side; head (in profile) at right angles to clypeus *languida* in part
Clypeus with scattered hairs, rectangular (emarginate in front in some specimens); head and clypeus convex as if in one piece . *rufa*

Diploaxis subcostata Blanchard

Figures 90, 99, 103, 217

Diploaxis [sic] *subcostata* BLANCHARD, 1850, p. 171 ["Savannah (Georgie)"; type not found in Muséum National d'Histoire Naturelle, Paris]. FALL, 1909, pl. 1, fig. 19 (clypeus and claw).

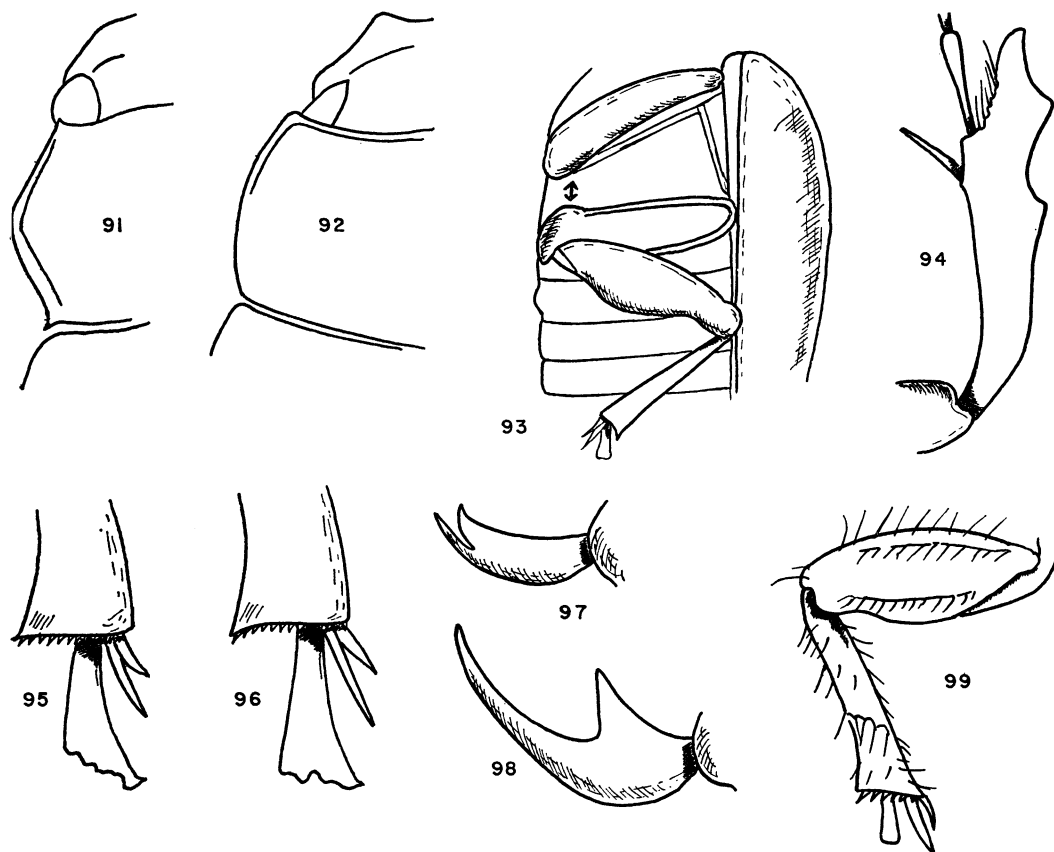
Diploaxis castanea BURMEISTER, 1855, p. 262 ("North America"; type, female, in the Martin-Luther-Universität, Halle).

DIAGNOSIS: This is apparently the only species in the genus (except for an occasional specimen of *languida* and *subrugata*, with the process between the front legs bicarinate instead of unicarinate. With its large, bulbous hind femora, its bisinuate and constricted pronotal sides, and its eastern distribution, it is readily distinguished from other species except *rufa*. Differs from *rufa* in the prosternal process, in the non-hairy clypeus, longer, flatter labrum, impressed clypeal suture, and non-impressed maxillary palpi segment.

RANGE: Eastern United States on the Atlantic coast from New Jersey (and Pennsylvania, according to Fall, 1909) south to Florida (not the tip of Florida) and west on the Gulf coast to Mississippi (and Texas, according to Fall, 1909). A total of about 150 specimens have been examined (see Appendix).

HABITAT: Seven specimens from Alachua County, Florida, are labeled "*Pinus palustris*"; they were collected by F. Young on April 16, 1946; a male from Liberty County, April 28, 1946, was taken "On Grape," and a male and female, May 1, 1946 "On *Q. [Quercus?] cinerea*," all collected by F. Young.

DESCRIPTION: Length, 9 to 13 mm. Color dark red, some specimens black. Head descending rather abruptly to clypeal suture, which is impressed deeply from side to side,



FIGS. 91-94. Body parts of *Diplotaxis*. 91. *D. microchele*, three-quarter view of pronotum, showing hind angle and furrow of side. 92. *D. circulans*. 93. *D. macronycha*, lateral view, showing short metasternum, bulbous hind femur, and swollen second abdominal segment. 94. Right front "stepped" tibia characteristic of *brevicollis-haydenii* group.

FIGS. 95-96. Prolonged basal tarsal segments depending from right hind tibiae. 95. *D. kuschei*. 96. *D. exstans*; characteristic also of *D. sinuans*.

FIGS. 97, 98. Subequal front tarsal claws of males of *D. anthracina*. 97. Outer (normal) claw. 98. Enlarged inner claw.

FIG. 99. Right hind femur and tibia of *D. subcostata*.

head irregularly and sparsely punctured in most specimens (densely in a few), surface either smooth or with impressions between eyes, a transverse area behind clypeus in some tumid and/or impunctate. Clypeus about one-third of the length of the head, punctured more densely than head, surface in many specimens rugose, even transversely tumid in front of suture in some, especially at sides, front margin scarcely reflexed, emarginate in most specimens but truncate in a few, angles rounded, sides bent inward in front of eyes. Eyes not sunk, about one-fifth of the width of head. Antennae 10-segmented, club as long as funicle. Mandibles large,

rather bulbous. Maxillary palpi with last segment not impressed at base. Labrum flat, at least in front (slightly concave behind), densely, rugosely punctured, level with and twice longer than reflexed under side of clypeus, the latter furrowed in some specimens, front margin only slightly arcuate. Mentum with declivity in apical third or fourth slightly advanced, its surface flat, its posterior edge slightly arcuate, margined, and pubescent.

Pronotum with punctures of disc sparse and irregular, of same size as and in some specimens sparser than those on head, sides widest at middle, where they are bulbous in

most specimens, thence slightly or strongly sinuate to front and hind angles, the former acute or subacute, the latter right-angled and sharp, angles depressed in a few specimens; sides of base transversely depressed in a few, with or without pruinose coating. Scutellum punctured or not. Elytra about three times longer than pronotum, punctures slightly larger and denser in many specimens, but variable; second interval multipunctate; costae flat or convex, with smaller punctures; marginal hairs about as long as width of a sutural interval; reflexed margins as wide near apex as opposite hind coxae. Metasternum twice as long as second abdominal segment. Hind coxal plate truncate laterally, but slightly angulate in front. Pygidium punctured densely and rugosely, some specimens with center longitudinal crease. Propygidium with groove, when present, indistinct.

Front tibiae with apical tooth very long and deeply emarginate on outer side, more widely separated from subapical tooth than the latter is from third tooth, which is situated behind middle and is no more than a minute angulation in most specimens (fig. 90). Hind femora (fig. 99) fat and bulbous, slightly or distinctly wider than second abdominal segment is long. Middle tarsi with first segment longer than second, hind tarsi with it slightly shorter, hind tarsi about as long as hind tibiae. Hind tibiae with setose carinae at apical third, extending obliquely across face of tibiae, setae long, spurs with paler area at apex. Claws bent abruptly, cleft at apex, tooth close to claw, as long as and slightly wider than apex of claw. Male genitalia about as shown in figure 217 of *microchele*, but inner sides joined nearer base; basal piece of about same length as lobes.

SEXUAL DIMORPHISM: The sexes are difficult to distinguish because the longer spur of the hind tibiae is longer than the first tarsal segment in both sexes (not longer in the female only, as in most *Diplotaxis*), and there is not much difference in the shape of the male and female pygidium or in the relative length of the fifth abdominal segment. The hind femora, however, are somewhat more bulbous and wide in females, the hind tibiae more flared out at apex, and the tarsi shorter.

REMARKS: Although Blanchard's type was not available to me, there is no doubt about

the identification of this species, which, as explained by LeConte (1856, p. 267), has the pronotum, though variable, "always obtusely rounded at middle, sinuate before and behind, with acute angles." Through the courtesy of Dr. J. O. Husing, director of the university at Halle, Germany, I was able to examine the type of Burmeister's *castanea* which is a fine specimen of a female *subcostata*. This name was synonymized by Fall in 1909, but LeConte (1856, p. 273) had already suggested its synonymy with a question mark. (In Leng, 1920, p. 254, *castanea* is erroneously given as a synonym of *sordida* Say, as well as of *subcostata*. The synonym of *sordida* should be *carbonaria* Burmeister.)

The pronotum of this species is so exaggerated in some specimens (as it is also in *liberta* and in other species of the *brevicollis* group, and as in *punctatorugosa*) that it might be considered to belong to a distinct species. The exaggeration lies in the great sinuosity of the sides of the pronotum, which results in emphasizing the acuteness of the front angles and the constriction and depression at the hind angles. Some of these exaggerated specimens have the head very sparsely punctured; others have it almost as densely punctured as *rufa*; a few have the sides of the base opaque and eroded. (See *rufa* for comparison with that species.)

Fall (1909, pp. 15, 49) made the first and only mention in the literature of the bicarinate prosternal process, using it in his key and in his redescription to distinguish *subcostata* from *rufa*. I have seen a specimen from Myrtle Beach, Florida, with this process tricarinate. The only other species in which the process varies from the usual unicarinate form are *languida*, in which a few specimens have a double carina, and the hairy species *subrugata* Moser (see Vaurie, 1958, p. 340).

Diplotaxis rufa Linell

Figure 194

Diplotaxis rufa LINELL, 1895, p. 725 (Georgiana, Florida; type, apparently male, in the United States National Museum). FALL, 1909, pl. 1, figs. 19, 20 (claw and clypeus).

DIAGNOSIS: No other species has such a deeply, coarsely pitted, almost tuberculate head and clypeus, both of which are uni-

formly convex as if they formed one piece. In this character and in the hairs on the clypeal disc, this species differs further from the larger *subcostata* and from the smaller *languida*, both of which are otherwise very similar and which occur in about the same areas.

RANGE: Eastern and western coasts of Florida. Only 16 specimens have been examined (see Appendix).

DESCRIPTION: Length, 7.5 to 9 mm. Color tawny or dark red. Head, from vertex, convex across clypeal suture, which is obliterated at middle by punctures, to front of clypeus, head and clypeus equally densely, rugosely, confluent punctured. Clypeus hairy on disc, about one-half of the length of head, front margin slightly emarginate but appearing truncate, reflexed only by thickness of margin, sides almost parallel, binding inward in front of eyes. Eyes and antennae as in *subcostata*, but antennae in a few specimens appear to be nine-segmented. Mandibles small. Maxillary palpi with last segment deeply impressed. Labrum as in *subcostata*, but not quite twice as long as under side of clypeus. Mentum virtually flat, a very short declivity in apical fifth marked only by hairs.

Pronotum as in *subcostata*, but distinctly wider at base than at apex, sides only slightly sinuate and angles and sides of base not depressed or pruinose. Scutellum punctured sparsely or densely. Elytra as in *subcostata*, except that second interval in some specimens has more or less a single irregular row of punctures. Metasternum, hind coxal plate, pygidium, propygidium, legs, and claws as in *subcostata*, except first two segments of hind tibiae are of same length in some specimens. Male genitalia, including basal piece, like those of *punctatorugosa* (fig. 194), but smaller.

SEXUAL DIMORPHISM: As in *subcostata*, but for certain identification of the sex, specimens should be dissected.

REMARKS: It is singular that this species, which is so similar to *subcostata* in the pronotum and general appearance, should differ from it in two important characters, i.e., the hairy clypeus of *rufa* and the bicarinate prosternal process of *subcostata*. The other differences between the two can be seen from the above description, the most significant ones being the smaller mandibles of *rufa*, shorter labrum and clypeus, impressed palpal seg-

ment, and the almost rectangular, squared-off shape of the clypeus. In addition, *rufa* appears to be rare in collections, only 16 specimens having been examined by me.

Diplotaxis rufa agrees with *languida* (Georgia, Florida) in the labrum, mentum, mandibles, large hind femora, carination of the hind tibiae, claws, and male genitalia, but differs, in addition to the characters given in the diagnosis, by being larger and darker, by having the clypeus slightly emarginate at middle, not truncate, the pronotal sides less sinuate, and the clypeus shorter. The antennae are nine-segmented in *languida* and 10-segmented in *rufa*, but some few of the latter appear to have only nine segments on one side (the sixth and seventh segments are short and compressed and may actually be fused in some specimens).

***Diplotaxis languida* LeConte**

Figure 194

Diplotaxis languida LECONTE, 1878, p. 402 (Tampa [Florida]; type, female, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 44 (clypeus).

DIAGNOSIS: This tiny, pale, elongate species with reddish pronotum and straw-colored elytra is at once recognizable. It is also one of the few species in the genus with both nine-segmented antennae and with fat, bulbous, hind femora.

RANGE: Extreme southern Georgia through northern and central Florida south to Tampa and the Lake Okeechobee region. About 100 specimens have been examined (see Appendix).

HABITAT: According to Schwarz (1878, p. 451), this species is "common in April, on oak trees, at night." Two specimens from Alachua County, Florida, were collected by F. Young on "*Quercus laevis*," May 1, 1947.

DESCRIPTION: Length, 5.5 to 7.5 mm. Color tawny, head and pronotum usually darker, more reddish. Head descending abruptly to clypeal suture, which is obliterated at middle, punctured rather densely, in some specimens confluent. Clypeus one-third (in some one-half) of the length of head, with the same kind of punctures as on head, front margin reflexed by thickness of rolled-back margin, truncate between rounded angles, sides bent inward in

front of eyes. Eyes as in *subcostata*, but slightly larger in some specimens. Antennae nine-segmented. Mandibles small. Maxillary palpi with last segment deeply impressed. Labrum as in *subcostata*, but scarcely, if at all, longer than under side of clypeus. Mentum virtually flat, with very short, scarcely marked declivity.

Pronotum with punctures of disc coarse and sparse, or coarse and confluent, with polished elevated areas; sides widest and bulbous at middle, thence gently sinuate to obtuse front and hind angles. Scutellum, elytra, metasternum, and hind coxal plate as in *subcostata*, except that some specimens have an irregular single row of punctures on second interval of elytra. Pygidium uniformly densely punctured. Propygidium not grooved. Legs and claws as in *subcostata*. Male genitalia as in *punctatorugosa* (fig. 194), but smaller; basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *subcostata*, except that males are usually recognizable by their more transverse pygidium, and the hind femora are as broad in males as in females.

REMARKS: This is one of the smallest species in the genus. Although Fall (1909, p. 82) remarks that "the size, color and habitat" are usually "amply sufficient" for the identification of this species, he forgets that his *bidentata* from the same (and other) areas, is often as small, is sometimes pale in color instead of the usual black, and has much the same head and rounded clypeus. It is true that *bidentata* differs, not only in its ovate convex shape, but also in its punctuation and in other characters as given under that species.

Diplotaxis languida seems closely allied to the larger *rufa* and *subcostata*, which occur in the same localities, but differs from them by having the margin of the clypeus rounded from side to side without emargination at the middle; it differs from *rufa* also by lacking hairs on the clypeus and by having the head and clypeus on different planes, not convex throughout. The bicarinate prosternal process characteristic of *subcostata* occurs also in *languida*, although not in every specimen. In this species the two carinae are not distinct as in *subcostata*, but are somewhat irregular and ill defined, often with a third carina (the original one?) in between.

The nine-segmented antennae have not

been mentioned previously, and *languida* should be added to the species of the genus with this number, making nine instead of eight species (Vaurie, 1958, p. 274). Some specimens of *rufa* appear to have only nine segments because the sixth and seventh are very short and pressed close together.

Another small, pale, eastern species with rounded clypeus in western Florida is *frondicola*, which differs from *languida* by having the teeth of the front tibiae small and all in front of the middle, the pronotum very large, with smaller, denser punctuation, and the hind femora only half of the width of those of *languida*.

Diplotaxis bidentata LeConte

Figure 194

Diplotaxis bidentata LECONTE, 1856, p. 271 (Georgia; a male and a female syntype in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 44 (clypeus).

DIAGNOSIS: This species can be separated from all others by the following combination of characters: distribution in the eastern United States (not Texas); ovate shape, small size; polished, glabrous surface; short, rounded clypeus; very large punctures of elytra in uniform single rows, elytral costae scarcely punctate; head and pronotum sparsely punctured, head not transversely tumid; front tibiae virtually bidentate, apical tooth very long.

RANGE: The Atlantic coast from New Jersey south to Florida and along the Gulf coast to Mississippi. Approximately 600 specimens have been examined (see Appendix).

HABITAT: A specimen from La Grange, Brevard County, Florida, was taken in September, 1913, "on spruce pine." Six specimens were found "in sand under defoliated Persimmon tree," by H. P. Loding in Baldwin County, Alabama, on June 24, 1923. A specimen from Alachua County, Florida, collected by F. Young, May, 1937, is marked "*Quercus laevis*."

DESCRIPTION: Length, 6 to 8 mm. Color dark red or black, some specimens light brown. Head and clypeal suture as in *subcostata*. Clypeus about one-third of the length of head, punctured a little more densely than head, front margin rounded from side to side

in an arc, reflexed only by the slightly thickened margin which is rolled back at the middle; sides not bent inward. Eyes, antennae, mandibles, palpi, labrum, and mentum as in *subcostata*, except mandibles shorter and somewhat less stout and under side of clypeus not at all furrowed.

Pronotum with punctures of disc sparse, sides widest at middle but only slightly arcuate, gently rounded to obtuse hind angles and to acute or right-angled front angles, angles not depressed, base not depressed. Scutellum as in *subcostata*. Elytra about three times longer than pronotum, punctures of same size and density; second interval with single row of punctures as large as those of striae (double row in a few specimens); costae flat, shining, impunctate in most specimens; marginal hairs shorter than width of a sutural interval (scarcely visible in most specimens); reflexed elytral margins narrow. Metasternum between coxae one and one-half times longer than second abdominal segment. Hind coxal plate and propygidium as in *subcostata*. Pygidium sparsely or densely punctured, in many specimens convex and "bumpy." Front tibiae as in *subcostata*, except third tooth more often obsolete than present. Hind femora not, or scarcely (in female), wider than length of second abdominal segment. Middle tarsi as in *subcostata*, hind tarsi with first two segments equal in length, hind tarsi as long as hind tibiae. Setose carinae and claws as in *subcostata*. Male genitalia as in *punctatorugosa* (fig. 194) but shorter; basal piece longer than lobes.

SEXUAL DIMORPHISM: Both sexes have the soles of the tarsi quite hairy, though not forming hairy pads; otherwise as in *subcostata*, except the hind femora of males are not wider than length of second abdominal segment.

REMARKS: This small polished species, which resembles many species of the exotic genus *Apogonia* in its convex, ovate appearance, is often recognizable without the aid of a microscope. The pronotum has the sides evenly rounded, not sinuate as in the others of the group, and the hind femora of the male are much narrower than those of the foregoing species. Although it is very different from *languida* in appearance because of the wider, roundish shape and black or reddish, not pale yellow, color, there are not many stated differences; *bidentata*, however, has the

clypeus more evenly rounded, the sides oblique, not bent inward, the antennae distinctly 10-segmented, not nine-segmented, the last segment of the palpi not impressed, and the labrum longer and larger. This species could probably be associated as well with the species of the *frondicola* group with rounded clypeus, in which respect it is similar to *brevisetosa* (Texas) and *punctatorugosa*, differing from the former as stated under that species, and from *punctatorugosa* in the ovate shape, by lacking a frontal ridge on the head, and by having the angles of the pronotum and the base of the elytra near the humerus not depressed and the declivity of the mentum flat, not sinuate at the middle. Both these species have about the same range, although *bidentata* is less widespread, and occur together in a number of counties in Florida; *bidentata* appears to be more common in Florida. Although *bidentata* was described from Georgia, I have seen only a few specimens from only two localities in that state, whereas from Florida I have seen about 400.

SPECIES GROUP *BREVICOLLIS-HAYDENII*

The following 26 species are included in this group in the order in which they are discussed:

SECTION 1: *Diplotaxis brevicollis* LeConte; *magna* Bates; *persisae* Cazier; *parvicollis* Fall; *semifoveata* Fall; *profunda* Vaurie and Cazier; *impar* Vaurie and Cazier; *circulans*, new species.

SECTION 2: *Diplotaxis bakeri* Cazier; *belfragei* Fall; *obscura* LeConte; *tristis* Kirby; *dahli* Cazier; *boops* Bates.

SECTION 3: *Diplotaxis haydenii* LeConte; *sierrae* Fall; *insignis* LeConte; *dentella* Fall; *ungulata* Cazier; *statura* Cazier; *completa* Cazier; *parallela* Fall; *aequalis* Cazier; *atlantis* Fall; *liberta* Germar.

SECTION 4: *Diplotaxis mentalis* Fall.

The earliest names in this group are actually *liberta* Germar, 1824, and *tristis* Kirby, 1837 (the type of the genus), but I am using *brevicollis* and *haydenii*, both LeConte, 1856, as each is more typical of the two types of labrum and mentum present in the group. Approximately 4000 specimens have been examined, including the types (or syntypes) of all the forms except for the following: *liberta* Germar; *consequens* and *nigropicea* of Walker; *corpulenta* Burmeister; *georgiae* Blanchard;

falli Saylor; and *moesta* Say. Only one new species (from northeastern Mexico) is described in this group. On the other hand, there are almost as many synonyms (23) as species (26), of which 14 are synonymized here for the first time. This attests to the great amount of variability in most of the members of the group.

The species included here are dorsally glabrous except for *dahli*. They are characterized mainly by a furrow, or transverse, often sinuous depression on the under side of the clypeus, and very large, bulbous mandibles that are as long, in some species, as either the labrum or the mentum, both mandibles in repose are equally large, not one larger than the other. They are further characterized by a prominent labrum that is scarcely if at all punctate and that is not on a level with the under side of the clypeus (as in most species of the genus), but is more or less advanced from it, in some species strongly so. (There are exceptions to the above statements on the furrow and labrum in some specimens of *aequalis* and *parallela*.) Additional characters are the relatively small, widely spaced eyes which (seen from below) do not reach all the way to the gular region; the relatively short antennal club; the widely reflexed side margins of the elytra towards their apex; and the strongly cut-out or "stepped" front tibiae on the inner side (see fig. 94). Unfortunately, this last character is so subject to wear that it is not very useful, but in fresh specimens it is quite striking. All the species have the first segment of the middle tarsi longer than the second. The clypeal angles are rounded or obtuse, not dentiform. The majority of species are large (10 to 12 or 15 mm.), although *mentalis*, *persisae*, *impar*, and *profunda* are smaller, but there are, of course, always some smaller specimens in every species.

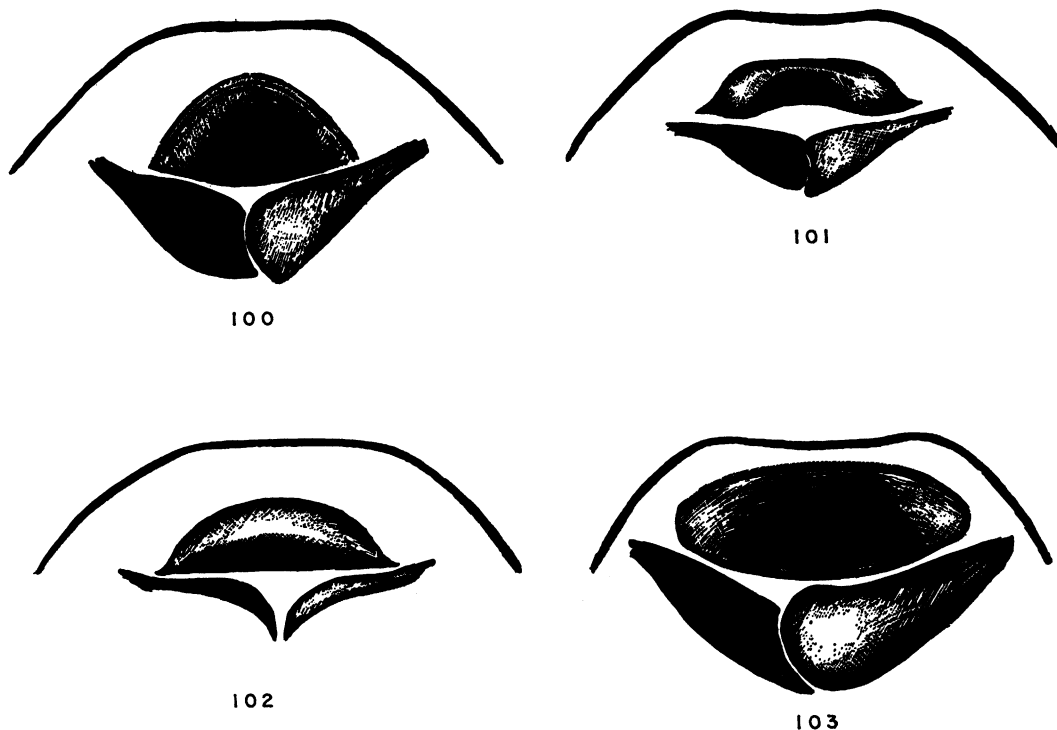
In this group the lobes of the male genitalia, which prove to be diagnostic of many species in other groups, are of little value, being virtually alike or with the same variations in all species. There are, however, slight differences in *parvicollis*, *circulans*, *bakeri*, *parallela*, *sierrae*, *aequalis*, and *mentalis*. In some species the lobes are joined a trifle nearer the base than as shown in *brevicollis* (fig. 222), but most species are essentially the same. In some

the proportion of the basal piece to the lobes varies. The shape of the eighth sternite varies intraspecifically.

CHARACTERS OF THE *brevicollis*-*haydenii* GROUP

The species of the group are from 8 to 16 mm. long; some are tawny in color, some dark or black, the color varying within the species. Additional characters not mentioned in the discussion above (and not repeated in the formal descriptions that follow) are: clypeus not hairy; antennae with 10 segments; abdomen not carinate laterally; front tibiae tridentate; hind coxal plate with a small angle in front that extends onto the reflexed elytral margin (the angle is often worn so that the appearance becomes truncate); spiracles of propygidium not prominent; carinae of hind tibiae variable. Each species in the formal descriptions is compared with *brevicollis* (except for *bakeri* and *belfragei* which are compared with *circulans*), so that the similar characteristics are not repeated. The division into sections is based on the combinations of labrum and mentum in the group. About half of the species have the labrum long and hollow at the center, narrow, arched in front, as in *brevicollis* (fig. 100); half again of these have the mentum not hollow as in *brevicollis* but transversely declivous. Eleven species have the labrum short and wide and nearly straight in front as in *haydenii* (fig. 101), and the mentum with various kinds of apical declivity. (In certain specimens of *aequalis*, *boops*, *dahli*, *liberta*, *obscura*, *sierrae*, and *tristis*, the labrum falls more or less between the *brevicollis*-like labrum and the *haydenii*-like labrum.) One species (*mentalis*) has the labrum still different and the mentum convex and with no apparent declivity.

With these characters are those of the clypeus (truncate or emarginate), the marginal hairs of the elytra (short or very long; most of the very long hairs are in the *haydenii* section), and the claws. The claws in some species have the unguis tooth subapical and are rather abruptly bent (*aequalis*, *atlantis*, *bakeri*, *circulans*, *liberta*, *obscura*, *parallela*, and *tristis*); in other species the tooth is always at the middle or even behind the middle of the



FIGS. 100–103. Labra, mandibles, and under sides of clypeus of *Diplotaxis*, ventral views. 100. Long, hollow labrum and large, bulbous mandibles of *D. brevicollis* and allies. 101. Short, wide, concave labrum and large mandibles of *D. completa*, *D. haydenii*, and allies. 102. Convex labrum and small, narrow mandibles of *D. convexilabrum*. 103. Long, wide, concave labrum and large mandibles of *D. decima*; characteristic also of *subcostata* and some species of *frondicola* and *simplex* groups.

claw (*dentella*, *haydenii*, *insignis*, *statura*, and *ungulata*), and in the remainder (13 species), either both kinds of claw are present, or the tooth is more or less between, appearing submedian or subapical on different legs or on different individuals of the same species. Males tend to have the tooth farther from the apex. About half of the species have the front of the head flat; the remainder have it transversely tumid, or depressed between the eyes, or variable. The majority of species (except for *aequalis*, *atlantis*, *dahli*, *mentalis*, and *sierae*) have either the front or the hind angles of the pronotum or both depressed and/or acute.

As for the habitat of these species, nine (*belfragei*, *brevicollis*, *completa*, *dahli*, *dentella*, *haydenii*, *insignis*, *mentalis*, *parallela*) have been taken on or found associated with juniper trees and some also with yellow pine. Notations of habitat are given also for *liberta*,

magna, and *obscura*, but no such data are available to me on the remaining 14 species.

COMPARISON WITH SPECIES OF OTHER GROUPS

The combination of the furrow on the under side of the clypeus, the bulbous mandibles, rather small eyes, prominent and not, or scarcely, punctured labrum, and the rounded, not sharp or dentiform, angles of the clypeus serves in most cases to separate members of this group from those of other groups.

Two dorsally hairy species in a group by themselves that have these characters, however, are *sordida* and *vandykei* from the eastern United States (the furrow under the clypeus was not mentioned in the treatment of these species in Vaurie, 1958, pp. 382–386). Perhaps these species belong in, or at least close to, this group, as they seem to differ in

only two characters, i.e., the elytra have virtually no costae or ribs showing and are covered with fine, confluent punctures, and the top of the head is polished and impunctate.

Another group composed of two northern species (*residua* and *tenebrosa*) might be confused with smaller members of the *brevicollis* group, although these species do not have the under side of the clypeus truly furrowed or such large mandibles.

The *brevidens* group of three large glabrous species differs by having large eyes, no furrow, and distinctive secondary sexual characters in the male (hairy hind tibiae and/or abdomen).

Some specimens of *sulcatula* and *puncticeps* in the *frondicola* group have a faint furrow on the under side of the clypeus, but they have narrow and smaller, flatter, not bulbous, mandibles. Some individuals of *subcostata* (*subcostata* group) might be considered to have a clypeal furrow, but they differ by having the labrum densely punctured, the prosternal process bicarinate, and different tibiae.

DISTRIBUTION OF THE SPECIES

About half of the species of the group occur in the southwestern United States as well as northern Mexico; no species occurs south of Hidalgo in eastern Mexico or of Zacatecas in western Mexico; and four species have not been taken north of Mexico (*bakeri*, *circulans*, *impar*, and *profunda*). Two species (*brevicollis*, *obscura*) inhabit western Canada southward, and *tristis* and *liberta* inhabit eastern Canada and the eastern United States; another eastern species is *atlantis*. Three species (*dahli*, *insignis*, and *sierrae*) are restricted to California and its immediate vicinity; and two, to Arizona (*aequalis* and *semifoveata*). A few of the species are evidently rare in collections; *dahli* is known from the type and two paratypes; *ungulata*, from the type and two other specimens; *statura*, from six specimens; *aequalis*, from 19; *circulans*, from 21; and *semifoveata*, from 24.

TREATMENT

Many species are keyed out more than once in the following key, appearing in various couplets. Such treatment is necessary, because many parts of the anatomy vary (clypeus, claws, pronotal angles, front of the

head, labrum, and mentum) and because the marginal hairs (a good diagnostic character) are often worn short. Thus two species (*haydenii* and *boops*) that usually key to clypeus "truncate," as stated in couplet 4, may occasionally have it emarginate, and four that key to "emarginate" (*sierrae*, *insignis*, *dentella*, and *completa*) may have it truncate; therefore these species are keyed out in both parts of couplet 4 to the subsequent couplets 5 and 30.

KEY TO THE SPECIES OF THE *brevicollis-haydenii* GROUP

1. Elytra with long dorsal hairs; California *dahli*
Elytra glabrous or with minute hairs that scarcely emerge from the depths of the punctures; California or elsewhere 2
2. Base of clypeus with sharp, transverse, punctate ridge extending nearly from eye to eye; western United States, including Texas; Chihuahua, Mexico *mentalis*
Base of clypeus not transversely ridged 3
3. Species with all of following characters: clypeus with front margin truncate or virtually so; front of head either transversely tumid or with area behind clypeus less punctate than rest of head; tooth of claw virtually median (fig. 5); marginal hairs of elytra as long as scutellum; labrum about four times wider than long; front angles of pronotum acute, drawn forward; all western United States; northern Chihuahua, Mexico *haydenii* in part
Species not agreeing with all of above characters 4
4. Clypeus with front margin slightly or strongly emarginate 5
Clypeus with front margin truncate 30
5. Species occurring east of the Mississippi River or in Minnesota 6
Species occurring west of the Mississippi or in Mexico 8
6. Pronotum with large, irregular, impunctate areas as large as scutellum; labrum at middle not longer than under side of clypeus; southern as well as northern states *liberta*
Pronotum punctured densely with touching punctures except for narrow, impunctate center space; labrum at middle longer than under side of clypeus; not occurring south of New Jersey 7

7. Marginal hairs of elytra not visible from above; eastern Canada and north-eastern United States west to Wisconsin and Minnesota *tristis*
Marginal hairs of elytra as long as scutellum in fresh specimens, at least visible in worn ones; eastern specimens known from Michigan and Illinois only *obscura* in part
- 8(5). Labrum deeply concave throughout, its front margin strongly arched (as in an arc of a circle; fig. 100), and labrum either as wide as long or not more than twice wider than long, at middle distinctly longer than reflexed under side of clypeus 9
Labrum shallowly concave behind, flat or convex in front, with front margin nearly straight (fig. 101), and labrum nearly three times wider than long, at middle not or scarcely longer than under side of clypeus 22
9. Mentum sunk, not transversely declivous, its depression with rear edge either obliterated at middle or at least not extending forward or not setose; depression often nearly as large and hollow as concavity of labrum 10
Mentum not sunk but may be concave, either with transverse declivity at or in front of middle, hind edge of declivity extending forward (its surface either flat or concave from side to side), or mentum with apical declivity flat and delimited by distinct or setose hind margin 18
10. Pronotum with hind angles, in some specimens also front angles, furnished dorsally with scattered yellow hairs; Chihuahua and Durango, Mexico . . . *impar*
Pronotum with all angles hairless . . . 11
11. Head flat in front, not tumid, and hind angles of pronotum not at all impressed; lobes of male genitalia joined on inner side near middle (fig. 220); Coahuila and Hidalgo in northeastern and eastern Mexico *circulans*
Head, pronotal angles, and locality not all as stated above; lobes of male genitalia joined at basal third; north-western Mexico or the United States 12
12. Pronotum at base or sides of base with well-marked pruinose or opaque areas 13
Pronotum shining at base 14
13. Large (12 to 16 mm.); color usually black or piceous; pygidium punctured densely *magna* in part
Smaller (7.5 to 9.5 mm.); color usually tawny or brownish; pygidium usually punctured sparsely *persisae*
14. Pronotum with hind angles flat or convex, not concave within; front of head usually transversely tumid; southern Arizona *semifoveata*
Pronotum with hind angles either shallowly or deeply concave within; front head tumid or smooth; Arizona or elsewhere 15
- 15.¹ Front of head flat or smoothly convex; smaller (8.5 to 12 mm.) 16
Front of head transversely tumid or with uneven surface; larger (10.5 to 16 mm.) 17
16. Male genitalia elongate, widened abruptly at apex (fig. 225); elytra appearing sericeous, punctures of costae minute and usually in irregular row; pronotum appearing shorter than head and clypeus combined, its front angles scarcely produced or impressed, hind angles sharp; western United States and Chihuahua, Mexico . . . *parvicollis*
Male genitalia short, not widened apically (fig. 222); elytra generally more shining, punctures of costae almost as large as those of side intervals and in a regular row; pronotum appearing as long as head and clypeus combined, its front angles strongly produced and impressed, hind angles rather rounded off; southern Chihuahua and Durango *profunda*
17. Pronotum with coarse, dense, deeply impressed punctures; elytra usually opaque, dull, strongly costate, punctures of first and second (the broad) intervals usually touching, coarse *magna* in part
Pronotum with fine, sparse, scarcely impressed punctures; elytra shining, feebly costate, punctures of intervals usually separated, fine . . . *brevicollis*
- 18(9). Species with hind femora punctate over entire area, front angles of pronotum not at all acute or concave, and occurring in California or western Nevada *sierrae* in part
Hind femora either impunctate or with a few scattered punctures between the submarginal lines of punctures; if doubtful, then either not occurring in

¹ This character varies, so that a specimen may have to be tried in both parts of the couplet.

- California or Nevada, or front angles of pronotum acute and concave . . . 19
19. Pronotum with front and hind angles deeply concave (shallowly concave in some); apical declivity of mentum with posterior edge margined and setose (but may be worn), base of mentum flat or depressed; Canada and western United States (but not Texas)
 *obscura* in part
 Pronotum with front angles feebly concave in some specimens but hind angles not at all concave; apical declivity of mentum with posterior edge sharp or blunt, not margined or setose, base of mentum either flat or jutting obliquely forward; western United States east of California and Nevada, including Texas; northern Mexico 20
20. Clypeus very feebly emarginate in front and as long as at least one-half of length of head; declivity of mentum appearing rather flat, not advanced; mostly Arizona, also northwestern Mexico. *boops* in part
 Clypeus distinctly emarginate and about one-third of length of head; declivity of mentum either advanced prominently as a ledge or deeply concave from side to side 21
21. Head coarsely punctured; declivity of mentum usually as long as one-half of length of mentum; size, 10 to 14 mm.; claws toothed either medially or subapically (figs. 5, 6); western United States and northeastern Mexico
 *belfragei*
 Head finely, shallowly punctured; declivity of mentum usually no longer than one-third of length of mentum; size, 8.5 to 11 mm.; claws toothed in front of middle (fig. 6); northeastern Mexico only *bakeri*
- 22(8). Pronotum with hind angles not impressed or concave 23
 Pronotum with hind angles distinctly impressed or concave 29
23. Species occurring in California, Nevada, Utah, Idaho; marginal hairs of elytra at middle as long as or longer than scutellum 24
 Species occurring south or east of above states; marginal hairs of elytra at middle in a few specimens as long as scutellum, but in the majority only half as long 25
24. Hind femora behind submarginal lines of punctures moderately or densely punctured; tooth of claws slightly in front of middle (fig. 6)
 *sierrae* in part
 Hind femora between submarginal lines of punctures impunctate or with no more than six or seven punctures; tooth of claws distinctly median (fig. 5)
 *insignis* in part
25. Front of head either tumid (with slight or strong post-clypeal convexity) or level with clypeus and punctured more sparsely than rest of head; northern Mexico and southern Texas
 *completa* in part
 Front of head not tumid but flat and level with clypeus and punctured quite densely and uniformly, as on rest of head; northern Mexico; Arizona, New Mexico, western Texas 26
26. Claws with apex of tooth in front of middle (nearer apex than base of claw), tooth pressed close to and wider than apex of claw (fig. 6); southern Arizona and northern Mexico . . . *boops* in part
 Claws with apex of tooth at or behind middle (midway between apex and base of claw), tooth minute and erect; Arizona, northern Mexico, and elsewhere 27
27. Hind femora distinctly wider than second segment of abdomen is long, their margins arcuate; western Texas and northwestern Coahuila, Mexico
 *statura*
 Hind femora narrower than or as wide as second segment of abdomen is long, their margins subparallel 28
28. Species not occurring in Texas; second interval of elytra usually, but not always, with but a single row of large punctures; under side of clypeus distinctly furrowed; Arizona, New Mexico; Sonora, Mexico . . . *dentella* in part
 Species occurring in western Texas, north central New Mexico, and eastern Arizona; second interval of elytra with more or less double row of punctures; under side of clypeus flat or feebly furrowed (only three males known)
 *ungulata*
- 29(22). Pronotum and head equally densely punctured; clypeus distinctly emarginate at middle; declivity of mentum rather flat, ridged posteriorly
 *obscura* in part
 Pronotum more sparsely punctured than head; clypeus only perceptibly emarginate at middle; declivity of mentum

- jutting forward, posteriorly sharp, but not ridged *haydenii* in part
- 30(4). Species occurring in eastern United States and/or Oklahoma, Nebraska, Kansas, and North and South Dakota31
- Species occurring in the western United States from southern Texas north and west to the West Coast, or in northern Mexico32
31. Pronotum with sides nearly straight, the front angles not acute; elytra with marginal hairs scarcely visible beyond epipleurae; claws toothed subapically; Oklahoma and eastward *atlantis*
- Pronotum with sides distinctly arcuate, the front angles acute and impressed; elytra with marginal hairs at least as long as scutellum; claws toothed medially; not east of Oklahoma *haydenii* in part
32. Pronotum with hind angles shallowly or broadly impressed within; transverse furrow of under side of clypeus weak or absent33
- Pronotum with hind angles not impressed, but either flat or rather convex; furrow of under side of clypeus usually distinct34
33. Clypeus at middle about one-half of length of head; pronotum with sides sinuate before front and hind angles; dorsal surface rather shining, smooth; size, 10 to 12.5 mm.; Arizona, New Mexico *parallela*
- Clypeus nearly as long as head; pronotum with sides widening to hind angles, not sinuate (sides nearly parallel in basal half, when viewed from above); dorsum usually rather opaque, rugose; size, 12 to 14 mm.; Arizona only (no more than 20 specimens seen) *aequalis*
34. Species occurring in California, Nevada, Utah, Idaho35
- Species occurring south or east of above states36
35. Hind femora between submarginal lines of punctures moderately or densely punctured; tooth of claws slightly in front of middle *sierrae* in part
- Hind femora between submarginal lines of punctures impunctate or with no more than six or seven punctures; tooth of claws distinctly median *insignis* in part
36. Labrum at middle longer than under side of clypeus, and front angles of pronotum (seen from above) rectangular or obtuse; claws toothed in front of middle

. *boops* in part

Labrum at middle of same length as or shorter than under side of clypeus, and front angles of pronotum (seen from above) acute, even if small, and drawn forward; claws toothed in front of middle or at middle37

37. Species occurring in Arizona, New Mexico, or Sonora, Mexico; front of head more or less flat and on same level with clypeus, not tumid, and punctured densely and uniformly as on rest of head *dentella* in part

Species occurring in southern Texas and northern Mexico (but not Sonora); front of head either transversely tumid, or, if not, then punctured more sparsely behind clypeus than on rest of head *completa* in part

SECTION 1 OF THE SPECIES GROUP *brevicollis-haydenii*

The eight species in this section (*brevicollis*, *magna*, *persisae*, *parvicollis*, *semifoveata*, *profunda*, *impar*, and *circulans*) have both the labrum and the mentum hollowed out (fig. 100), the labrum with the front edge strongly arched, and the mentum with the hind edge of its more or less circular depression obliterated at the middle. In an occasional specimen the hollow of the mentum is situated farther front, or the hind edge of the depression is visible, so that some specimens may be confused with species of section 2.

Diplotaxis brevicollis Leconte

Figures 94, 100, 222, 223

Diplotaxis brevicollis LECONTE, 1856, p. 267 (Steilacoom, Washington Territory [=Washington]; type, female, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, fig. 13 (clypeus and claw).

Ancylonycha nigropicea WALKER, 1866, p. 322 (British Columbia; type in the British Museum).

Diplotaxis transversicollis MOSER, 1918, p. 309 (Durango, Mexico; type, female, in Zoologisches Museum, Berlin). New synonymy.

DIAGNOSIS: A typical specimen of this large shining species is immediately recognizable by the four broadly and deeply impressed angles of the pronotum, the fact that the front angles are also drawn forward acutely, and by the large hollow labrum and mentum (fig. 100). (See under remarks below for less typical specimens.) The very fine pronotal punc-

tuation and smaller, sparser elytral punctuation distinguish it from *magna* which it otherwise resembles.

RANGE: All the western states from British Columbia in Canada south to southwestern Durango in Mexico (excluding Sonora and Baja California), as far east as Montana and extreme western Texas. Approximately 375 specimens have been examined (see Appendix).

HABITAT: According to data supplied by C. Clayton Hoff on specimens from New Mexico, this species was taken "4 inches beneath surface of soil under yellow pine," in litter of yellow pine, and at lights in pine and juniper woods; also "under rocks" and "under dung," probably just hiding.

DESCRIPTION: Length, 10.5 to 15 mm. Color dark red to black. Head and clypeus combined (when each is viewed while in horizontal position) nearly as long as pronotum. Head with rather uneven surface, either with a transverse post-clypeal convexity and the area in front of it impunctate, or with two vague round depressions between eyes, or with both; finely and densely punctured, but punctures not touching (some punctures rather sparse). Clypeal suture distinctly impressed and either straight or slightly sinuate. Clypeus about one-half of the length of head (less in some specimens), punctures of same size as those on head but denser in most specimens, front margin strongly sinuate (emarginate) between rounded angles, margin either scarcely reflexed or broadly reflexed at middle, sides oblique, not sinuate, canthi not prominent. Eyes not sunk, flattened on sides, below not reaching to gular region, each eye one-sixth or one-seventh of the width of head. Antennae 10-segmented, club shorter than funicle. Mandibles large and bulbous. Maxillary palpi with last segment either flattened at base or actually impressed. Labrum apparently impunctate, strongly hollowed out, deeply concave from side to side, front margin arched in true semicircle, at middle longer than at sides and longer (by about one and one-half or two times) than and distinctly advanced from reflexed under side of clypeus, the latter transversely furrowed. Mentum in apical half broadly, deeply concave to nearly the same depth as labrum, this concavity not margined or pubescent behind.

Pronotum (surface with tiny punctulations) transverse, punctures of disc scarcely impressed, irregular, fine, sparser than those on head, center in some specimens with impunctate area of varying dimensions, sides widest at middle, thence gently or strongly arcuate to acute and drawn-forward front angles and to right-angled or obtusely angled hind angles, all angles broadly and deeply depressed within (hind angles only shallowly depressed in some specimens); base not depressed or noticeably margined. Scutellum impunctate in most specimens, punctures on each side of base in others. Elytra nearly four times longer than pronotum, punctures larger than those on pronotum, but equally sparse; second interval multipunctate; costae and suture flat or slightly convex, with row of minute punctures (irregular row in some specimens); marginal hairs at middle as long as width of one sutural interval, in some specimens as long as width of two sutural intervals; reflexed elytral margin as wide opposite last segments of abdomen as opposite hind coxae. Metasternum between coxae at least twice as long as second abdominal segment, the latter in some specimens slightly tumid at center. Pygidium convex, densely punctured. Propygidium deeply grooved.

Front tibiae with three teeth in front of middle, inner apical edge cut in steps (fig. 94). Hind femora not wider than length of second abdominal segment; lower margin nearly straight in most specimens; middle tarsi with first segment longer than second, hind tarsi with it either shorter than or same length as second, hind tarsi longer than hind tibiae. Claws curved gently, apex of tooth either nearer apex of claw than base, or nearly median, tooth shorter and wider than apex of claw. Male genitalia as in figures 222 and 223; basal piece about same length as lobes.

SEXUAL DIMORPHISM: Males have the pygidium distinctly more transverse than do females and the first segment of the hind tarsi longer and narrower (as long as the second segment and as long as the hind tibial spur, but in females shorter than the second segment and spur and widened at apex). The fifth segment of the abdomen at the middle is the same length as the fourth in females, but shorter than the fourth in males; the hind femora are wider in females than in males; the

hind tibiae are strongly flared out apically in females, less flared in males.

REMARKS: Although a female from British Columbia in the collection of the British Museum is labeled "type," this cannot be the type, because LeConte states (1856, p. 267) that he had only "one specimen collected by George Gibbs, Esq., at Steilacoom, Washington Territory."

This species proves to be as confusingly variable as some of the other widespread large species (*haydenii*, *obscura*, *parvicollis*, and *magna*) from approximately the same geographical areas. Even the characteristic long and deeply concave labrum varies somewhat in length, but it is always as long as, if not longer than, wide and distinctly longer than the reflexed under side of the clypeus; it is always distinctly concave. In a few specimens the hollow mentum has a sharp but not margined edge. Variability is found in the canthi, which may be angulate or not; in the claws, which may be toothed submedially or nearer to the apex; in the angles of the pronotum, which show all degrees of impression, and which in a few specimens (including a number of individuals from Mexico) are not at all impressed; in the sides of the pronotum, which are evenly arcuate, or nearly parallel at base, or strongly constricted (sinuate) at base and apex. The post-clypeal convexity across the head and the depressions behind vary in strength, and in perhaps a dozen or more individuals they are virtually absent; the head in these specimens (from British Columbia; Greer, Flagstaff, and Rustlers Camp in Arizona; El Salto in Durango; Creel in Chihuahua) is smooth and flat but may have a transverse impunctate area behind the clypeus. Most of these specimens have the typically depressed pronotal angles of the species, but some do not. In some specimens the punctuation of the head is exceedingly sparse. The least variable characters are apparently the clypeus, which is always sinuate, and the pronotal punctuation, which is almost always fine and sparse and shallow.

Some small specimens of *brevicollis* might be mistaken for *parvicollis*, or *profunda*, or *semifoveata* which have a similar labrum and mentum. The two former species, however, have the head generally smooth (not tumid or depressed), and *parvicollis*, in addition, has

different genitalia. *Diplotaxis semifoveata*, although a smaller species, is more difficult to separate from *brevicollis* but differs by having the punctuation rather more dense and the hind angles of the pronotum not depressed (both these characters may be found in a few specimens of *brevicollis*, however). Both *semifoveata* and *parvicollis* have the elytra somewhat opaque or dull, not so shining as in *brevicollis*, and the punctures of the elytral costae proportionately larger, not minute as in *brevicollis*.

It is curious that no specimens have been reported from the area between southern Chihuahua and the United States or from the state of Sonora, but as this same gap occurs in the range of *magna*, probably it is due to a lack of intensive collecting in this area. Both these species have been collected at El Salto, Durango, and at Gaborachic, Chihuahua, as well as in other similar localities in states farther north, but *brevicollis* has a more extensive range. In Arizona, they occur together in almost all localities.

I have not examined Walker's *nigropicea* (British Columbia) described as *Ancylonycha*, but LeConte, who saw the type, says (1870, p. 400) that it is the same species as *brevicollis*, remarking that "nearly all of his [Walker's] species proved on inspection to be well known to American entomologists under other names."

The type of *transversicollis* (Durango, Mexico) I have examined, and, although it differs from most *brevicollis* by lacking the impressed angles of the pronotum, it agrees in every other respect, and I believe it represents an individual variation. Of 23 other specimens examined from Chihuahua and Durango, three or four also have no impressed angles (as in "*transversicollis*"), but six have the angles impressed much as in typical *brevicollis*, and the remainder are about intermediate in this respect, having the angles partially impressed, or having the front angles impressed but not the hind angles. (A few of the many individuals from the United States and Canada also have the angles virtually unimpressed, and there is, as stated above, much variation throughout the range.) One extreme is a pronotum that resembles that of *boops* Bates, and the other is one that resembles the most extreme pronotum of *magna* (the angles

so deeply impressed or pinched as to cause the sides to be bulbous). When the angles are impressed, the sides of the pronotum are sinuate at front and rear. It seems evident that the pronotal angles cannot be relied upon for the separation of these species, and I therefore consider Moser's *transversicollis* a synonym of *brevicollis*. In an eastern species (*liberta*), which is readily distinguished from its western allies and from most other species, the sinuosity of the sides of the pronotum and the constriction and shape of the front angles are also variable.

***Diplotaxis magna* Bates**

Figures 222, 223

Diplotaxis magna BATES, 1888 (1887-1888), p. 165 ("Ciudad in Durango," Durango, Mexico; type, male, in the British Museum).

Diplotaxis costulata FALL, 1909, p. 36, pl. 1, figs. 11, 13 (claw, clypeus) (Williams, Arizona; type, female, in the Museum of Comparative Zoölogy). New synonymy.

Diplotaxis impressicollis MOSER, 1918, p. 308 (Mexico); type, male, in Zoologisches Museum, Berlin). New synonymy.

DIAGNOSIS: A combination of the following characters serves to distinguish this species: large size (up to 16 mm.); generally dull, not shiny, often rugose elytra with strong ribbed appearance and short marginal hairs; deeply hollowed-out labrum and mentum, the labrum strongly arcuate in front; and coarse, dense punctures on the generally shining surface of the pronotum. The coarse pronotum resembles that of *obscura*, but the latter has a different mentum. The labrum and mentum are as in *brevicollis*, but the latter differs by having fine pronotal punctuation.

RANGE: Southern Utah and southern Colorado, northern New Mexico, all of Arizona (mostly in the mountains), south to southwestern Durango, Mexico. One specimen has been examined from Mono County in central eastern California. Approximately 270 specimens have been examined. (For further data, see Appendix.)

HABITAT: Specimens were collected in New Mexico from Berlese samples of lumber pine litter, by sweeping pinyon pines at night, and at light, according to information supplied by C. Clayton Hoff.

DESCRIPTION: Length, 12 to 16 mm. Color

generally black. Agrees with description of *brevicollis*, except as follows: head with coarse touching punctures (four specimens from Durango have no post-clypeal convexity); clypeus with punctures of same size and density as those of head; pronotum with punctures of disc distinctly impressed (in some deeply and confluent), of same size and density as those of head (less dense in a few specimens), a center longitudinal impunctate (but punctulate) space of varying length present in many specimens, angles not markedly depressed in all specimens, and front angles in some not so large, or acute, or drawn forward, sides either evenly arcuate or distinctly sinuate with base constricted; a few specimens with base at sides pruinose; elytral punctures of same size as those on pronotum, but sparse; costae convex in most specimens, their punctures minute or larger; surface in most specimens opaque, rugose; marginal hairs sparse, not longer than a sutural interval is wide; claws in some specimens with tooth appearing submedian. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This appears to be the largest species in the genus, with the exception of *punctulata* Horn from Baja California. Similar variations appear in this species as are discussed for *brevicollis* (which precedes), as regards the head, the claws, the shape of the sides of the pronotum, and the degree of depression of its angles. A number of forms have been described for these variations (see below), as is also true for *brevicollis*. Even these two species may at times be difficult to separate from each other, although the typical examples of each are quite different. Thus most specimens of *magna* have the elytra opaque, with the costae evident to the naked eye, the punctures more abundant and denser, and the punctuation of the head, clypeus, and especially the pronotum coarse and dense, often confluent. Many individuals, however, have a shining surface as in *brevicollis*, and some have smaller, less dense, punctures than is usual and in this respect also resemble *brevicollis*. Most individuals of the two species, however, are separable; also no examples of *magna* have been seen from Texas or from the states north of Utah and Colorado, areas into which *brevicollis* extends.

The only difference discernible between some few specimens of *magna* and the equally coarsely punctured *obscura* LeConte (although the latter, as is true of *brevicollis*, has a much more extensive geographic range) is in the mentum, which is sunken in *magna* in about the apical half and has no trace of a posterior ridge, but in *obscura* has a distinct short declivity in about the apical fourth (or third), the declivity having its posterior edge ridged and truncated, its surface flat or very slightly concave.

The types of *magna*, *costulata*, and *impressicollis* (all of which I have examined) each differ one from the other in respect to the pronotum, but not otherwise, and I therefore consider but one species to be represented. The pronotum may have exceedingly sinuous sides that are strongly constricted in front and rear, all angles depressed deeply, the front angles acute and drawn forward (as in the type of *magna* from Durango, and to a lesser degree in some other specimens from Durango); or the pronotum may have the same kinds of angles as mentioned, but have the sides not constricted, at least not at the base, where they are almost parallel, as in the type of *costulata* from northern Arizona; or the pronotum may be as in the type of *costulata* but have the entire basal half (except at the center) depressed and eroded and pruinose (as in the type of *impressicollis* from "Mexico"). Although I have seen only two specimens (from Balleza, Chihuahua, and the type of *impressicollis*) with the pronotum so widely eroded, quite a few specimens have been seen from the United States with a certain degree of pruinosity, and the type of *magna* and some specimens from Durango have either the front or the hind angles or both pruinose. (Strong erosion of the sides of the pronotum at the base is characteristic of many specimens of the smaller species, *persisae* and *impar*, a few individuals of which can scarcely be differentiated from the eroded *magna* except for their smaller size.) In addition, some specimens from Arizona have the sides of the pronotum rather evenly rounded, not sinuous, the angles shallowly, if at all, depressed, and the front angles more blunt than acute or drawn forward. On any of the above-described individual types of pronotum, there may be present a smooth-looking center line,

flat or elevated, short or extending from the base to the apex. All variations and combinations of these pronotal characters occur, so that it seems impossible to consider any of them as diagnostic of separate species.

The single specimen from eastern California is rather isolated, but it is similar to other specimens with the front angles of the pronotum somewhat blunt and the elytra shining, not opaque. There is another wide gap in the range of the species between Arizona and southern Chihuahua, so that this one is perhaps not unusual.

Diplotaxis persisae Cazier

Figures 222, 223

Diplotaxis persisae CAZIER, 1940c, p. 133 (Chiricahua Mountains [Cochise County], Arizona; type, female, in the American Museum of Natural History).

DIAGNOSIS: Differs from all others of the group except some specimens of *magna* and some of *impar* by having pruinose or opaque areas extending along the base of the pronotum from the hind angles inward towards, but not including, the center. Only a few individuals of *magna* have the pronotum pruinose, and *magna* is a much larger species (12 to 16 mm.). (See table 5 under *impar* for comparison with that species.)

RANGE: Chiricahua Mountains of southern Arizona south to southern Chihuahua, Mexico. A total of 95 specimens has been examined (see Appendix).

DESCRIPTION: Length, 7.5 to 9.5 mm. Color light or dark reddish brown. Agrees with description of *brevicollis*, except as follows: head smooth, mostly finely and densely punctured, the area behind clypeus partly impunctate in most specimens and slightly declivous in some; clypeus about one-third or one-fourth of the length of head, front margin scarcely reflexed; maxillary palpi with last segment not impressed; pronotum with punctures of disc sparse or dense, regular or irregular, distinctly impressed, front angles in some specimens scarcely acute or drawn forward, hind angles right or obtuse, base of pronotum from hind angles to near center, depressed, impunctate, and opaque, the opaqueness (or pruinosity) in several specimens covering all the sides of the pronotum which appear also

eroded, base margined; elytra with punctures of same size and density as those of pronotum, punctures of costae in some specimens nearly as large as those of intervals; second abdominal segment not tumid; pygidium rather flat; hind tarsi no longer than hind tibiae. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: Although described from the United States, this species has since proved to be more abundant in northern Mexico. The type was a unique specimen, and I have seen only seven other specimens from the United States, all from the Chiricahua Mountains, but taken 14, 19, and 22 years later than the type. Two of these have the outer third of the pronotum on each side strongly eroded as well as strongly pruinose, whereas the specimens from Mexico (87 examples) have the pruinosity more restricted to the base of the pronotum and not extending forward on the sides (the type is about intermediate in this respect). Although this opaque area varies in size, it is present in all specimens examined, and in the majority of specimens does not extend entirely across the base as does a similar opaque band in some individuals of *impar* from Durango. These individuals of *impar* from Durango, as well as some individuals from Chihuahua, have the base of the elytra also rather opaque, a condition not found in *persisae* (see table 5 for further comparisons).

Although *parvicollis* (Arizona, New Mexico, Colorado, and Chihuahua) lacks the pronotal pruinosity characteristic of *persisae*, some specimens have the hind angles depressed and are exceedingly similar to *persisae*, but the genitalia of the males differ (see *parvicollis*). In *semifoveata* (Arizona only), the hind angles of the pronotum are neither pruinose nor depressed.

Diplotaxis parvicollis Fall

Figures 225, 226

Diplotaxis parvicollis FALL, 1909, p. 38, pl. 1, fig. 13 (type locality not designated, but the type, a male, is from Las Vegas, New Mexico, in the Museum of Comparative Zoölogy).

Diplotaxis labrata MOSER, 1918, p. 311 ("Mexico"; type, male, in the Zoologisches Museum, Berlin). New synonymy.

Diplotaxis acononicus CAZIER, 1940c, p. 131

(Huachuca Mountains, Arizona; type, male, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: This species and *circulans* appear to be the only ones among the *brevicollis* type of species (hollow mentum and long, concave labrum, with strongly arched front margin) that have different male genitalia (see figs. 220, 222, and 225 for comparison). Externally *parvicollis* differs from *brevicollis*, as seen in the description that follows, and from *semifoveata* as shown in table 4.

RANGE: Colorado, New Mexico, and Arizona in the United States, and Chihuahua in northwestern Mexico. Approximately 250 specimens have been examined, only about 30 of these being from Mexico (see Appendix).

DESCRIPTION: Length, 8.5 to 12 mm. Color light or dark reddish brown. Agrees with description given for *brevicollis* except as follows: head smooth, not uneven, in some specimens, but a few having an indistinct, not abrupt, post-clypeal declivity or tumidity; clypeus with front margin scarcely reflexed; maxillary palpi not impressed on last segment; pronotum with punctures of about the same size and density as those on head, distinctly impressed, front angles acute and impressed in some specimens, scarcely so in others, hind angles right or obtuse, impressed and explanate in most specimens, but scarcely so in others; elytra rather opaque in most specimens, punctures of same size as those of pronotum, punctures of costae in some specimens nearly as large as those of intervals, marginal hairs at middle no longer than (in many specimens shorter than) width of one sutural interval, hairs sparse and single; second segment of abdomen not tumid; pygidium with sparse punctures in many specimens; hind tarsi no longer than hind tibiae; apex of claw tooth situated at middle of claw in many, but not in all, specimens. Male genitalia as in figures 225 and 226; basal piece distinctly shorter than lobes.

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This is the most widespread and apparently the commonest of the four similar species of about the same size (*semifoveata*, *profunda*, *impar*, and *persisae*), differing from them in the male genitalia which have very strongly arched (in profile), elongate lobes

with widened, rather knobbed apices, the lobes distinctly longer than the basal piece. The species appears to be as variable as are *brevicollis*, *magna*, and some of the others mentioned in respect to the angles of the pronotum and the shape of the sides, the contour of the front of the head, and the tarsal claws. It is most likely to be confused with *semifoveata*. In table 4 the distinguishing characters considered more constant are placed first, but all the characters may vary slightly in both species. The elytra of both species are quite similar and differ somewhat from those of the other species. They are covered with numerous small punctures, some of which seem to be elongate, and their costae are flat, not convex or well defined. The punctures of the costae and of the pronotal disc are not so minute or so shallowly impressed as those in most specimens of *brevicollis* (in general a larger species).

The types of *labrata* ("Mexico") and of *acononicus* (Huachuca Mountains, Arizona) have been examined and do not appear to differ specifically from the type of *parvicollis* (also examined). All were dissected, and the male genitalia proved to be similar. The type of *labrata* has the hind angles of the pronotum rather concave; the type of *parvicollis* has been more concave; the type of *acononicus* has them scarcely concave—a difference found throughout the range of the species and

even within the same populations. Other differences given between *parvicollis* and *acononicus* (described from a single specimen) seem to me to be individual variations.

Among the specimens examined from Las Vegas, New Mexico (type locality of *parvicollis*) is one of interest labeled "Near Hot Springs, Las Vegas, N. M., 7000 ft., Aug., '82, F. H. Snow." This old specimen bears a determination label of LeConte's but no specific name; it bears a second label signed by Fall, identifying it as *haydenii* LeConte (a species of the same group but with different labrum and mentum); and a third label of Cazier's, identifying it as *acononicus*.

There are a few specimens (two males from La Jara, New Mexico, one male from Apache County, Arizona) that have a post-clypeal convexity as in *semifoveata* and the hind angles of the pronotum scarcely impressed, but have male genitalia that are similar to those of other specimens of *parvicollis*. In two large series from Wet Canyon and Arcadia Camp in the Graham Mountains, Arizona, the hind pronotal angles are only slightly depressed in most specimens, but distinctly so in some (a few *brevicollis* have been collected in these localities). The population with the greatest number of examples with the hind angles distinctly concave and explanate come from Carr Canyon, in the Huachuca Mountains, the type locality of *semifoveata*.

TABLE 4
SOME SPECIFIC DIFFERENCES BETWEEN TWO SPECIES OF *Diplotaxis*^a

<i>parvicollis</i>	<i>semifoveata</i>
Occurs in Arizona, New Mexico, Colorado, and northern Mexico	Occurs in southern Arizona
Male genitalia as in figures 225 and 226; basal piece distinctly shorter than lobes	Male genitalia as in figures 222 and 223; basal piece about same length as lobes
Front of head evenly rounded, not swollen	Front of head transversely swollen
Marginal hairs of elytra shorter than width of a sutural interval, sparser, all of same length	Marginal hairs longer, alternating one long and three or four short
Pronotum nearly as wide at base as at middle; hind angles at least slightly depressed within; front angles acute, but small	Pronotum widest at middle; hind angles flat, not depressed; front angles deeply depressed and drawn forward
Pygidium punctured sparsely	Pygidium punctured densely, uniformly
Claw tooth near middle of claw	Claw tooth nearer apex of claw
Hind tibiae of female with carinae less strong (not jutting out in profile view)	Hind tibiae of female with carinae strongly marked and jutting out

^a All characters except genitalia subject to considerable variation.

***Diplotaxis semifoveata* Fall**

Figures 222, 223

Diplotaxis semifoveata FALL, 1909, p. 38, pl. 1, fig. 13 (Huachuca Mountains, [Cochise County], Arizona; type, female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: This species is perhaps most similar to (and has the same elytral punctuation as) *parvicollis*, from which it differs as shown in table 4. Although generally smaller in size, it resembles also *brevicollis*, differing chiefly by having larger and more deeply impressed punctures on the pronotum and elytral costae, the elytra crowded with punctures, and the hind angles of the pronotum not depressed or concave.

RANGE: Mountains of southern Arizona. Twenty-four specimens have been examined from three mountain ranges (see Appendix).

DESCRIPTION: Length, 8.5 to 10 mm. Color light or dark reddish brown. Agrees with description of *brevicollis*, except as follows: clypeus less than one-half of the length of head (one-third in some specimens), front margin slightly reflexed; maxillary palpi not impressed on last segment; pronotum with punctures impressed, basal angles obtuse and not impressed within, front angles either shallowly or deeply impressed; elytra with punctures of same size as those of pronotum, punctures of costae in some specimens nearly as large as those of intervals; hind tarsi not longer than hind tibiae. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This species appears to be rather more constant in diagnostic characters than *parvicollis* or *brevicollis*, owing possibly to the smaller number of specimens examined (fewer than 30). Thus all specimens of *semifoveata* have a post-clypeal convexity, or at least a declivity, and all have the hind angles of the pronotum flat, not depressed. The ungual tooth of the claws, however, varies somewhat, although it seems generally more subapical than submedian. Possibly this form is only a small individual of *brevicollis* with non-impressed pronotal hind angles, as some individuals of *brevicollis* from Mexico also do not have the hind angles impressed, but the aspect of the elytra is usually quite different (see under *parvicollis*).

***Diplotaxis profunda* Vaurie and Cazier**

Figures 222, 223

Diplotaxis profunda VAURIE AND CAZIER, 1955, p. 17, figs. 1, 3A (Palos Colorados, Durango, Mexico; type, male, in the American Museum of Natural History).

DIAGNOSIS: This species is like a small individual of *brevicollis* but with the front of the head always smooth-surfaced, without depressions or post-clypeal convexity. It resembles also both *parvicollis* and *semifoveata*, differing from the former in characters of the male genitalia (figs. 222, 225) and in the more produced front angles of the pronotum; and from the latter in the distinctly and broadly depressed hind angles of the pronotum and the smooth-surfaced head; and from all three in the longer, deeper concavity of the mentum.

RANGE: The northwestern Mexican states of Chihuahua and Durango, from which the original 125 specimens have been examined as follows: *Chihuahua*: Salaices, 13 paratypes. *Durango*: Palos Colorados, 112 (including the type and paratypes).

DESCRIPTION: Length, 9 to 11.5 mm. Color black or dark red. Agrees with description of *brevicollis*, except as follows: head descending obliquely to clypeus, flat, without convexity or depression, punctures denser in front, sparse on vertex; clypeus only one-third of the length of head in most specimens; mentum concave in apical two-thirds or three-fourths; elytra with punctures of costae small, but not minute, and marginal hairs shorter than width of a sutural interval, scarcely visible in some specimens. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223), but proportionately shorter.

SEXUAL DIMORPHISM: As in *brevicollis*, except that males have the apex of the hind tibiae as flared out as do the females.

REMARKS: Of the *brevicollis* type of species with hollowed-out labrum and mentum, this one and *impar* have not been collected in the United States (see *impar* for comparison). In the diagnosis I mention the similarity of *profunda* to *brevicollis* (which extends from the United States into the northern states of Mexico, but not abundantly). A further difference between the two species is that the hind angles of the pronotum in *profunda* are

blunt and rounded off, whereas those of *brevicollis* (variable as they are) form, as a rule, distinct and sharp right angles. Also the marginal hairs of the elytra are shorter in *profunda*.

Although in the original description the tarsal claws were stated to be "evenly, shallowly rounded, cleft submedially" and were so shown in the figure (Vaurie and Cazier, 1955, fig. 3A), such a condition is not invariably true, as the position of the tooth on the claw varies in this species also, as it does in all members of this group, and the tooth may be either in front of the middle (fig. 6) or submedian (fig. 5).

***Diplotaxis impar* Vaurie and Cazier**

Figures 222, 223

Diplotaxis impar VAURIE AND CAZIER, 1955, p. 18, figs. 1, 2D-E, 3B (8 miles west of Matachic, Chihuahua, Mexico; type, male, in the American Museum of Natural History).

DIAGNOSIS: Differs from the dorsally glabrous forms by having a cluster of from four or five to 20 short yellow hairs on or within the hind angles of the pronotum, or on the sides near the angles, or on the front angles. It is otherwise very similar to *parvicollis*, *persisae*, and *magna*, although the latter is generally very much larger. Many individuals have the pronotum strongly constricted at the sides basally.

RANGE: States of Durango and Chihuahua in northwestern Mexico. The types and paratypes (172 specimens) have been examined from Matachic and vicinity; Terrero; and Salaices in Chihuahua; and from Palos Colorados in Durango; also one additional specimen (male) from El Salto, Durango. The Durango localities are in the southern half of the state.

DESCRIPTION: Length, 8 to 10 mm. Color dark red or black. Agrees with description of *brevicollis*, except as follows: head flat or evenly convex; clypeus one-third or one-fourth of the length of head; mentum at apical third concave from side to side, the posterior margin obliterated at middle, and in many specimens also at sides; pronotum in some specimens with sides widest behind middle, constricted and emarginate at base, hind angles and in some specimens also the front angles sparsely hairy; in other speci-

mens sides scarcely or not at all constricted at base, but explanate at the hind angles, angles somewhat depressed in most specimens, some with lateral margins rather obsolete in apical half, some with base and, to a lesser extent, apex of pronotum pruinose and/or eroded; elytra with punctures of same size and sparseness as those on disc of pronotum, base in many specimens rather pruinose; first and part of second abdominal segment with pruinose bloom in most specimens; pygidium rather flat; hind tarsi not longer than hind tibiae. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223), but shorter.

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This species appears to be unique in the genus in having pronotal hairs on an otherwise glabrous dorsum. These hairs are more noticeable on the hind angles than on the front ones. Both *impar* and *profunda* are the only ones of the group (except for *bakeri* and *circulans* from farther east in Mexico) not known from the United States, and they occur in some of the same localities in Chihuahua and Durango. *Diplotaxis profunda*, however, differs by having no hairs on the pronotal angles, which are also all very deeply impressed, and the mentum and labrum more strongly and deeply concave.

In 21 specimens of *impar* from Palos Colorados, Durango, the hind angles of the pronotum are so eroded and pruinose that the hairs are visible in only a few individuals. Although this population, because of the pruinose angles (and base) of the pronotum, resembles *persisae* (Chihuahua and Arizona), it has all the other characteristics of *impar* (see table 5). Both species have been taken together in Matachic in northern Chihuahua.

Another similar species collected with *impar* and *persisae* in good numbers at Matachic is *parvicollis*, which differs from the other two principally by having elongate and knobbed lobes on the genitalia of the male. This species has no pruinosity on the pronotum as does *persisae*, or on the abdomen, as does *impar*, and most examples of *parvicollis* have the clypeus rather longer.

The pronounced sinuation of the sides of the pronotum at the base is not present in all individuals, and all degrees of sinuation occur. Intergradation is found also in the partial obliteration of the side margins of the pro-

TABLE 5
SOME SPECIFIC DIFFERENCES BETWEEN TWO SPECIES OF *Diploptaxis*

<i>impar</i>	<i>persisae</i>
Occurs in Chihuahua and Durango	Occurs in Chihuahua and Arizona
Hind angles (sometimes front) of pronotum glabrous or pruinose, but with clusters of hairs within	Pronotal angles pruinose and hairless
Pygidium uniformly finely, shallowly, and densely punctured	Pygidium with irregular, coarser, deeper, sparser punctures
Pygidium with hairs too short and adpressed to be more than barely visible in profile	Pygidium with hairs in profile as long as spines on apex of hind tibiae; hairs erect
Abdominal segment 1 and part of 2 pruinose	Abdominal segments shining except in several specimens
Elytra generally sericeous, the base pruinose	Elytra generally shining throughout
Scutellum appearing distinctly longer than wide and impunctate in majority of specimens	Scutellum appearing equilateral and punctured rather densely in majority of specimens

notum apically, a condition that is present in some specimens, absent in others (that have the margins distinctly ridged), and intermediate in others.

***Diploptaxis circulans* Vaurie, new species**

Figures 92, 220, 221

TYPE MATERIAL: Type, male, Jacala, Hidalgo, Mexico, July 1, 1951, K. Hinchcliff, collector, in the American Museum of Natural History. One male and five female paratopotypes in the same museum; one male paratopotype in the University of Kansas, Lawrence; also three males and seven females from the same locality, but collected August 14, 1958, by H. F. Howden, in the Canadian National Collection, Ottawa.

DIAGNOSIS: The only reliable external characters distinguishing this species from *bakeri* and *belfragei* are the larger size, the scarcely, not strongly, arcuate sides of the pronotum (fig. 92), and the character of the mentum. The mentum has the entire front half or two-thirds sunken and hollow, without any delimiting margin to this circular depression except vaguely at the extreme sides; in other words the mentum has a concavity, but no transverse declivity. In the male genitalia the lobes are joined on their inner sides at about the middle, whereas in all other species of the group they are joined nearer the base (at about one-third or one-fourth from the base).

RANGE: From Jacala (at about 5000 feet) in eastern central Mexico north into eastern

Coahuila. One male and two females (not paratypes) have been examined from 7 miles south, 4 miles east, of Bella Union, Coahuila (7200 feet), collected by A. A. Alcorn, June 25, 1952.

DESCRIPTION OF TYPE, MALE: Length, 12.5 mm. Color black. Agrees with description of *brevicollis*, except as follows: head and clypeus with surface flat and even, without depressions or convexity, head finely and densely punctured in front, finely and sparsely in rear half (some punctures separated by more than twice their diameters); clypeal suture straight; clypeus not more than one-third of the length of head, punctured as on front of head, front margin strongly sinuate and bent back so as to show front edge of labrum when specimen is tipped backward slightly, broadly and shallowly reflexed; canthi obtusely angled; pronotum at center base with fine longitudinal crease, sides scarcely convergent in front, gently and evenly arcuate to tiny, acute, front angles and to obtuse, sharp, hind angles, angles not impressed, apical margin raised and thickened, making a rolled edge which is virtually impunctate except for a few minute punctures at sides; scutellum with nine punctures at base; elytra about three times longer than pronotum, costae and suture rather flat, the row of punctures irregular, marginal hairs too short to be visible from above; abdomen not tumid; pygidium flat with a short longitudinal crease; hind femora narrower than second abdominal segment is long, very

sparsely punctured; hind tarsi with first segment longer than second; claws nearly as long as claw segment, curved gently, tooth slightly nearer apex of claw than base, shorter and wider than claw. Genitalia as in figures 220 and 221; basal piece about same length as lobes.

SEXUAL DIMORPHISM: As in *brevicollis*, except for the pygidium which is only slightly more transverse in males than females, and for the claws which are longer in males.

VARIATIONS FROM TYPE: The length varies from 11.5 to 13 mm. Some of the paratypes or other specimens differ by having the clypeal suture slightly sinuate; clypeal punctures somewhat larger and/or confluent; front margin of clypeus either more sinuate or less reflexed at middle than at sides; sides of clypeus bent inward slightly; concavity of mentum longer, concavity with faint rear margin; pronotum without crease, or crease varying in length, apical margin with more punctures; scutellum impunctate or with from two to nine punctures; pygidium more sparsely punctured, without crease; hind coxal plate angulate at sides (probably worn in type); abdomen tumid; hind femora virtually impunctate. Two males have the lobes of the genitalia joined at more than halfway from base.

REMARKS: Both the labrum and the mentum are of the same circular type as found in the seven preceding *brevicollis*-like species (*brevicollis*, *magna*, *persisae*, *parvicollis*, *semifoveata*, *profunda*, and *impar*), all of which differ either by having the head tumid in front or the pronotal angles broadly depressed, and none of which occurs in the eastern part of Mexico. Only the labrum is of the same type as in the five species that follow (*bakeri*, *belfragei*, *obscura*, *tristis*, *dahli*), only two of which occur in Mexico. The mentum of these species differs by having a marked transverse declivity, or angulation, or concave ledge in the apical half or less, this declivity (even if rather flat) being delimited either by a margined or distinctly sharp posterior edge, or by its extension forward (and the edge sharp or blunt). Even in the species *bakeri* and *belfragei*, in which the declivity is often concave, its posterior margin is visible at the middle, not obliterated as in *circulans*. It must be stated, however, that the extent of

the concavity of the mentum is often difficult to judge, because the mentum itself is movable; also the sharp edge of the declivity may become worn. *Diplotaxis bakeri* and *belfragei* are very like each other and very similar to *circulans*, and all three forms occur in the vicinity of Monterrey (Bella Union, although in Coahuila, is not far from Monterrey). In this area they may not always be readily separable unless males are available, in which case the genitalia of *circulans* (fig. 220), with the lobes joined near the middle, would distinguish it from the others. (Six of the seven males of *circulans*, eight males of *bakeri*, and at least 30 males of *belfragei* have been dissected.) In contrast to that of *bakeri* and that of *belfragei*, the eighth sternite in *circulans* appears to be constant in shape, being very elongate and with the apex rounded.

SECTION 2 OF THE SPECIES GROUP

brevicollis-haydenii

These species (*bakeri*, *belfragei*, *obscura*, *tristis*, *dahli*, and *boops*) have the long, hollow, strongly arched labrum of the species of the preceding section, but the mentum differs by being, as stated in the second part of couplet 9 of the key to the species, "not sunk." In all except *belfragei* and *tristis*, the labrum is either somewhat less arched than in the *brevicollis*-like species, or it varies in length so that in some specimens it is scarcely longer than the reflexed under side of the clypeus.

Both *bakeri* and *belfragei* in the formal descriptions are compared with *circulans* instead of with *brevicollis*.

Diplotaxis bakeri Cazier

Figures 222, 223

Diplotaxis bakeri CAZIER, 1940b, p. 139 (Rancho La Golondrina, Rio Sabinas, Muzquiz, Coahuila, Mexico; type, female, in the American Museum of Natural History).

Diplotaxis volatica CAZIER, 1940b, p. 140 (Rancho La Golondrina, Rio Sabinas, Muzquiz, Coahuila, Mexico; type, male, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: Differs from all the species with the same kind of labrum (except *boops* and *belfragei*) either by having the mentum transversely declivous in front or by having

the front of the head flat, not tumid. Differs from *boops* by having the clypeus strongly emarginate, not truncate. Differs from *belfragei* in being of generally smaller size and in other relative differences given below, but it may be conspecific with it. (For comparison with *circulans*, see description below.)

RANGE: The vicinity of Monterrey in the state of Nuevo Leon, northeastern Mexico, and northwestward to Muzquiz, a town in eastern Coahuila, a rather restricted range. A total of 35 specimens have been examined (see Appendix).

DESCRIPTION: Length, 8.5 to 11 mm. Color black or dark red. This species is so similar to the foregoing, *circulans*, that only the differences from the description of the type of that species and its variations are given here (characters omitted from the description of *circulans* are the same as in *brevicollis*). In many specimens, head and clypeus combined distinctly shorter than pronotum. Labrum in some only about one and one-half times longer than reflexed under side of clypeus. Mentum distinctly transversely declivous in less than apical half, declivity either flat or slightly concave, its surface in some specimens rather uneven, its rear margin sharp, distinct, often somewhat scalloped, and advanced from rest of mentum. Pronotum with sides more strongly arcuate, strongly converging in front, thickened apical margin flat, less marked in some specimens. Elytra with costae slightly convex in some, punctures of costae more regular. Hind femora impunctate in some specimens. Claws distinctly shorter than claw segment, rather bent at apex, tooth nearer apex than base, shorter and wider than claw. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223) but stouter, and the apices less rounded, more truncate.

SEXUAL DIMORPHISM: As given for *brevicollis*. In addition the claws appear longer in males than in females.

REMARKS: Although *bakeri* has not yet been reported from north of Mexico in the area where *belfragei* is most common, the latter is represented in northeastern Mexico by five specimens, and possibly some of the many examples from the Big Bend area of Texas, identified as *belfragei*, are *bakeri*. It is further possible that *bakeri* is a variety of

belfragei and that *belfragei*, as now understood, actually is composed of more than one species. Examination of the series of *bakeri* shows that the mentum has a sharp transverse ledge in all specimens, but that the surface of the ledge is slightly concave in some, flat in others; this declivity or ledge is farther front in *bakeri* (in other words shorter) than in most, but not in all, specimens of *belfragei*. In *belfragei* the mentum is deeply concave from side to side in many specimens. The labrum, which is somewhat variable in length in both species, appears proportionately smaller in *bakeri*, thicker and more convex on the arcuate front margin. The elytra and the clypeus of *bakeri* also seem proportionately shorter than those of most specimens of *belfragei*, and in contrast the pronotum seems proportionately larger. The sides of the clypeus have a tendency to be more sinuate in *bakeri*, the punctures of the head less coarse. The male genitalia of eight individuals of *bakeri* are uniformly rather stout, with the apices rather truncate. A few specimens of *belfragei* have been seen with more or less this same aspect of genitalia, but the majority have the genitalia narrower and more elongate, as in *brevicollis*. In spite of these differences, which of course are relative, a small specimen (Bent, New Mexico) in Fall's series from which he chose the type of *protensa* [= *belfragei*] matches almost exactly one of the paratypes of *bakeri* in the shape of the pronotum, in the clypeus, labrum, and especially the mentum.

The type and paratype of *volatica* (small males of 8.5 mm., light reddish in color) have been examined, but do not seem to differ in any other characters except size, sex, and color from the type of *bakeri* and are considered conspecific with *bakeri*. The "longer anterior tarsi" (Cazier, 1940b, p. 141) of *volatica* are a character of the males.

***Diplotaxis belfragei* Fall**

Figures 222, 223

Diplotaxis belfragei FALL, 1909, p. 43, pl. 1, figs. 13, 15 (Texas, here restricted to western Texas; type, female, in the Museum of Comparative Zoölogy).

Diplotaxis belfragei var. *sinuata* FALL, 1909, p. 44, pl. 1, figs. 13, 15 (Pecos, New Mexico; type, female, in the Museum of Comparative Zoölogy).

Diplotaxis protensa FALL, 1932, p. 193 (Mesca-

lera Res[ervation], New Mexico; type, male, in the Museum of Comparative Zoölogy). New synonymy.

Diplotaxis cartwrighti CAZIER, 1940b, p. 144, (Tanque de Malone, La Babia, Coahuila, Mexico; type, male, in the American Museum of Natural History). New synonymy.

Diplotaxis stabilis CAZIER, 1940b, p. 145 (Mesa de la Encantada, Sierra del Carmen, Coahuila, Mexico, as given on label of type, but Sierra "de la Encantada" was given in description in place of "del Carmen"; type, female, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: The head, clypeus, pronotum (sides, angles, and punctuation), elytra, and in some instances the claws are similar to those of *dentella* and *bakeri*, neither of which is known from Texas; differs from the former by having the labrum long and hollow, strongly arched at the middle, not wider than long and the same length throughout; differs from *bakeri* only in the generally larger size, in the concave and longer mental declivity, and in the more coarsely punctured head. (For comparison with *circulans*, see description below.)

RANGE: From southern Colorado, eastern Arizona, New Mexico, western Oklahoma, and western and southern Texas southeastward into the northern states of Coahuila and Nuevo Leon, Mexico. In addition, two specimens were reported by Fall (1909, p. 44) from Utah, and I have seen in his collection a specimen (determined by Fall as *protensa*) from Yuma in western Arizona. The latter locality may be an error; the label is handwritten, not printed as are the others in the series, and this locality was not mentioned by Fall in his discussion of the form *protensa*. At least 250 specimens have been examined (see Appendix).

HABITAT: A male and a female were collected July 14, 1956, 2 miles west of Fort Davis, Texas, by H. and A. Howden, on "Juniper." Specimens from New Mexico were taken by sweeping oak and yellow pine at night, from Berlese samples of pinyon pine litter, and "under cow dung" in September (hibernating?), according to data supplied by C. Clayton Hoff.

DESCRIPTION: Length, 10 to 14 mm. Color black or dark red. Agrees with the description as given for *circulans*, except as follows: head

with punctures coarser throughout, some confluent in front, denser at rear, a post-clypeal convexity present in a few specimens (see remarks); clypeus in some specimens nearly one-half of the length of head; mentum transversely declivous in about apical half, declivity strongly concave from side to side, its surface smooth, its rear margin sharp, distinct, and advanced from rest of mentum; of pronotum, sides strongly arcuate at middle, convergent to front, a few specimens with sides sinuate, thickened apical margin with variable punctuation; scutellum punctured or not; pygidium convex, punctured sparsely or densely; hind femora of female as wide as length of second abdominal segment, with a few punctures in center; claws either long and gently curved, with tooth very short and submedian ("*sinuata*"), or short and rather bent, with tooth longer and more apical ("*protensa*"), or intermediate. Male genitalia, including basal piece, similar to those of *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*, except for the claws which appear somewhat shorter in females.

REMARKS: This species, as do *bakeri*, *obscura*, *tristis*, *boops*, and *dahli*, has a long hollow labrum of the *brevicollis* type and a transverse declivity on the mentum of the *haydenii* type, the mentum having the posterior edge sharp (unless worn), not convex. All the above species are quite different from *belfragei*, except *bakeri* which may prove to be conspecific (see *bakeri* for discussion).

As can be seen from the synonymy, *belfragei* is extremely variable. With many specimens (I have examined about 250) it is impossible to distinguish satisfactorily the various forms described (see synonymy), because all the characters vary to such a degree that specimens could be identified as one form or the other, depending on what set of characters one chose. If one were to consider only the type specimens of the five forms, one could distinguish them as follows: Two of the types have the pronotum longer, with the sides a little sinuate before the front and hind angles; one of these (*belfragei*: "Texas") is smaller (11.5 mm.) and has the claws toothed slightly in front of the middle, i.e., nearer to the apex than to the base of the claw; the other (*sinuata*: Pecos, New Mexico) is 14 mm.

and has the claw tooth distinctly median. The type of the third form (*protensa*: Mescalera Reservation, New Mexico) has the declivity of the mentum equally concave as, but longer than, the two just mentioned, the tooth of the claws even more apical in position than in *belfragei*, and the claws shorter and more bent. This type has a shorter pronotum, with strongly and evenly arcuate, not sinuate, sides, as does also the type of the fourth form (*cartwrighti*: La Babia, Coahuila) which resembles the type of *protensa*, except for the shorter declivity of the mentum with rather rounded-off edge (possibly worn). The type of the fifth form (*stabilis*: Sierra del Carmen, Coahuila) is the female of *cartwrighti*. (La Babia is on the edge of the Sierra del Carmen. This sierra, as well as the Serranias del Burro where a paratype of *cartwrighti* was taken, and the Sierra de la Encantada run southeastward from the border of Texas at about the level of the Big Bend area.)

When one examines additional specimens, however, one finds that there are many combinations and interchanges of these characters. Thus some individuals with apically toothed claws ("*protensa*" or "*cartwrighti*") may have the pronotum long and the sides sinuate (*belfragei* and "*sinuata*"); others may have medially toothed claws (*belfragei*) and the pronotum not sinuate ("*protensa*"). Many specimens with apically toothed claws ("*protensa*") have the mental declivity as short as that of those specimens with more medially toothed claws (*belfragei* and "*sinuata*"). I have seen a long series from Bent and Mescalera Reservation (southern New Mexico) in the collection of Cornell University that were determined by Fall as either *belfragei* or "*protensa*." On the basis of the position of the claw tooth, I found I agreed with Fall's division, except in the case of three or four individuals which he identified as *belfragei*, but which have the claws toothed apically as in "*protensa*." Both kinds of claw may be found in the same populations. Apparently the claws are toothed slightly differently on different pairs of legs, those on the middle pair, for example, being more distinctly median than on the front or hind pair in specimens with the tooth submedian. It seems true in most instances that the larger

specimens have more median claws. The difference is not sexual, although females may have shorter claws. This variability of the claws, whether median, submedian, or antemedian (with the subsequent difficulty of deciding what is the actual position of the claw), is present also in some other species of the group (*brevicollis*, *magna*, and others).

The variation in the mentum is principally a question of the length and degree of hollowness of the declivity. The latter in most specimens takes up half of the mentum, but in a few it takes up more than half (as in some specimens from Mescalera, the type locality of "*protensa*"). The clypeus varies from being very short (nearly one-third of the length of the head) to longer (one-half or less). Even the genitalia of the male vary in individuals that agree in other characters (as in four Texas males with the same mentum, pronotum, and claws, but with the inner lobes of the genitalia joined at varying distances from the base). In view of the foregoing, I consider all these forms the same species.

There is still another variation that may not even be this species. (The specimens of this kind, from Colorado, New Mexico, and Arizona, are marked with a question mark in the specimens examined in the Appendix.) These differ from other specimens by having the front of the head transversely tumid and sparsely punctured as in *haydenii* and *completa* (a few individuals from the Chisos Mountains, Texas, have, however, a slight trace of a post-clypeal convexity), but cannot be either of those species because they have a long hollow labrum and a distinctly concave mentum. They have the same aspect of head and clypeus as *obscura*, but they lack the depressed pronotal angles and the narrow hind femora of the male of *obscura*. The dorsal aspect would ally them with *completa*, but *completa* has a short wide labrum, shorter, flat mentum, and is not known from so far north.

Two other doubtful specimens are from Madera Canyon Park, Davis Mountains, and from Fort Davis, both in Texas. These appear to be *belfragei* because of the dense and uniform punctuation of the head and clypeus, without trace of any post-clypeal convexity, and the narrow hind femora of the female, but they have the labrum and mental decliv-

ity almost as short as those of *completa*, which occurs in some of the same localities (Ozona and Big Bend area of Texas, and Serranias del Burro, Coahuila). Perhaps additional specimens will help to clarify these problems.

***Diplotaxis obscura* Le Conte**

Figures 104, 222, 223

Diplotaxis obscura LECONTE, 1859a, p. 9 ("Black Hills" [South Dakota]; type, female, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, figs. 13, 18 (clypeus, claw).

Ancylonycha consequens WALKER, 1866, p. 322 (British Columbia or Vancouver; type in the British Museum).

Diplotaxis obscura var. *prominens* FALL, 1909, p. 47 (Pecos, New Mexico; type, female, in the Museum of Comparative Zoölogy).

Diplotaxis obscura var. *compacta* FALL, 1909, p. 48 (Utah; type, female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: Although this species has a labrum of the *brevicollis* type (long, arched, hollowed-out), it differs from others with the same kind of labrum by having the mentum transversely ridged in the apical third or fourth, not hollowed-out. It differs from other glabrous species with similar labrum and mentum either by having all the pronotal angles impressed and the front of the head transversely tumid, or by having long hairs on the elytral margins.

RANGE: From central New Mexico, Arizona, and California north into the western states of Canada (British Columbia, Alberta, and Saskatchewan). A few specimens have been seen from the Great Lakes region in Illinois and Michigan, but none from the area between this region and the western parts of North and South Dakota (see fig. 104). Approximately 200 specimens have been examined (see Appendix).

HABITAT: Four specimens were collected on "*Artemisia tridentata*" (sagebrush) at Iron Mask, Kamloops, British Columbia, by W. L. Pringle in May, 1956. A dozen specimens from 11 miles east of LaPine, Lake County, Oregon, July 30, 1957, are labeled "Larvae, pupae and adults in large ant nest." Dr. Paul O. Richter of Oregon State College, Corvallis, tells me (personal communication) that "the larvae seem to be root feeders and have roots available which have penetrated

the soil from outside the area cleared of surface vegetation by the ants." He does not believe these beetles are myrmecophilous, and apparently the ants do not bother them, because "we found about 30 new adults in cells in one brushy ant nest." Specimens from New Mexico (data supplied by C. Clayton Hoff) were found by sweeping grasses and herbs, oaks, and yellow pines at night.

DESCRIPTION: Length, 10 to 14 mm. Color dark red to black. Wings reduced in some specimens. Agrees with description of *brevicollis*, except as follows: head very densely punctured; clypeus in some specimens with punctures of same size and density as those on head; labrum in a few specimens less strongly arched in front and not always longer at middle than reflexed under side of clypeus; mentum at middle not sunk but flat and with a short declivity in apical third or fourth that is posteriorly ridged, virtually truncate, and actually setose, but setae usually worn off, surface of declivity flat or very slightly concave; pronotum with punctures of disc impressed, nearly as dense as those on head, but rather sparse in a few specimens, front angles pruinose in some specimens and in some scarcely drawn forward; elytra in those specimens with reduced wings less than three times longer than pronotum; punctures variable; marginal hairs longer than a sutural interval is wide but worn short in many specimens; metasternum in specimens with short wings scarcely longer than second abdominal segment; hind tarsi in short-winged females shorter than hind tibiae; claws with tooth situated in front of middle of claw. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: Among the 18 specimens in the collection of the British Museum, one from British Columbia is marked "type." At the time of LeConte's description (1859), he mentioned but one specimen, from the Black Hills, which I have seen in his collection, so that the specimen in London cannot be the type.

This is the only "western" species that occurs east of the Mississippi, as I have seen specimens from the region of the Great Lakes. Except for these records, it has the same range as *brevicollis*, and is very much

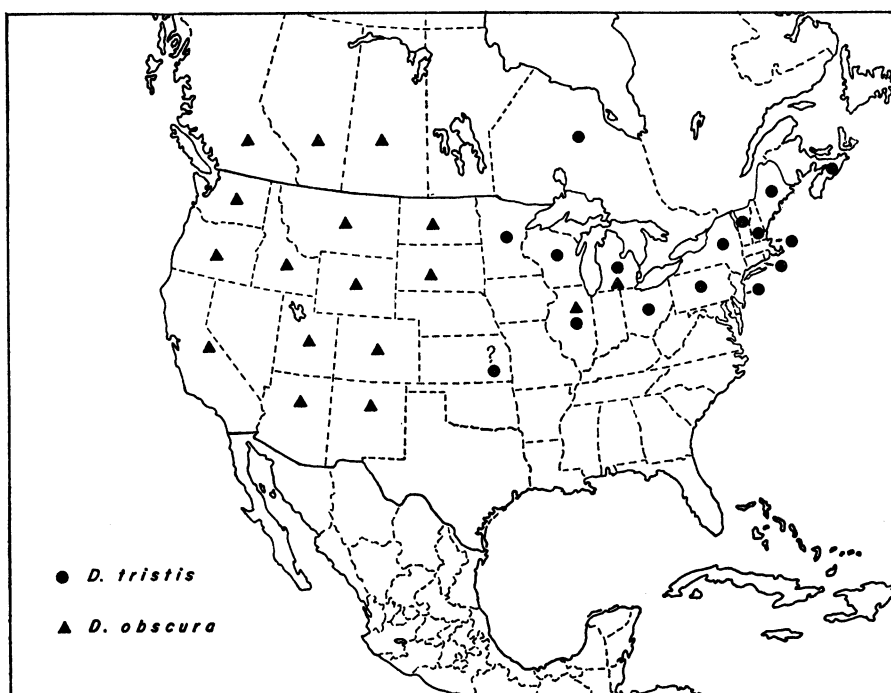


FIG. 104. Distribution of *Diplotaxis obscura* in the west, and of *D. tristis* in the east, of North America, showing *obscura* in the eastern states of Illinois and Michigan.

like both that species and *magna*, differing as stated in the diagnosis. All three species have been collected in some of the same localities in Arizona (Flagstaff, Grand Canyon, Greer), and in Utah (Bryce Canyon), and *brevicollis* and *obscura* in other states as well. *Diplotaxis obscura* differs further from *brevicollis* but resembles *magna* by having denser and coarser punctuation dorsally, and by having the pronotal front angles often pruinose. It is generally smaller than either.

Two other northern species are *haydenii* and *tenebrosa*, both of which have a much wider and shorter labrum (no longer than the reflexed under side of the clypeus), with the front edge scarcely curved at all; in addition, *haydenii* has the clypeus virtually straight in front, not sinuate, and *tenebrosa* has it much longer than that of *obscura* and also more reflexed in front. *Diplotaxis tenebrosa* may be difficult to differentiate externally from those few individuals of *obscura* that have the labrum also short, although the lobes of the genitalia of *obscura* do not have pointed apices as do those of *tenebrosa*. Such individ-

uals of *obscura* with short labrum have been noticed from the following localities: Kamela, Oregon; Montrose and Hermosa, Colorado; Genesee, Idaho; state of Washington; Grand Canyon, Arizona; Ashcroft, Crown Lake, and Vernon, British Columbia; Medicine Hat and Edmonton, Alberta. Not all the specimens from these localities have the labrum short; some have it as long as do typical specimens.

An exceedingly similar species is *tristis*, of which one of the syntypes in the British Museum is in fact *obscura*. This specimen is labeled "British Columbia," where *tristis* is not known to occur. Actually *tristis* has a somewhat different pronotum (longer than that of *obscura* and with the sides less arcuate), the elytra proportionately longer and with virtually no marginal hairs; it does not occur west of Minnesota, but both species have been taken in Michigan and in some of the same localities in the vicinity of the Great Lakes. Two rather more southern species, with more or less similar labrum and mentum as those of *obscura*, are *belfragei* and

bakeri, but these species have the declivity of the mentum either advanced forward, not flat as in *obscura*, or concave from side to side, and they differ further by having no impressed angles on the pronotum, and the hind femora of males as wide as the second abdominal segment is long, not narrower as in *obscura*.

Dimorphism in *obscura* consists of a small proportion of individuals that have reduced wings and therefore have a short metasternum (only slightly longer than the second abdominal segment), more oval and shorter elytra, the subapical callosities of the elytra obsolete, and the humeri less outstanding. The wings in such specimens reach to, or fall short of, the fourth abdominal segment and may either be unfolded or have a small flap folded under. Of a total of about 200 specimens examined, I have found 17 with short wings (from Maybell and Hermosa, Colorado; Grand Canyon and Kaibab National Forest, Arizona; Pine View and Salt Lake City, Utah; Carbon County, Wyoming; and Pocatello and Montpelier, Idaho). This variation was described by Fall as a variety of *obscura*, which he named *compacta* (type locality, Utah), and he had seen specimens from Wyoming (1909, p. 48) that "approach it [the type] rather more nearly than they do the true *obscura*." He mentions that the front angles of the pronotum are not at all prominent, but this character varies tremendously in this group. This same kind of dimorphism of the wing occurs in *fimbriata* and *muricata* (*frondicola* group).

Dalla Torre (1912) lists Walker's *consequens* as a separate species (p. 145), giving a reference to LeConte, 1870, but elsewhere lists it as a synonym of *obscura* (p. 147). In neither place does he note, as he does for *Ancylonycha nigropicea* Walker [= *D. brevicollis*], that *consequens* was described as *Ancylonycha*. LeConte (1870, p. 400) saw the types of both species of "*Ancyloncha*," but he could not identify *consequens* at the time "without reference to the series in my collection or to my monograph of the Melolonthidae of the United States." From what he says, however, "smaller . . . more strongly punctured and with the epistoma less reflexed" than that of *brevicollis*, it seems quite probable that *consequens* is the same as

obscura, with which species Fall (1909, p. 93) synonymized it. The only other species recorded from the western Canadian states are *subangulata*, *haydenii*, and *tenebrosa*, none of which agrees as well as *obscura* with the above statements by LeConte.

Fall's variety *prominens* (Pecos, New Mexico) appears to be no more than a variation with the pronotal front angles slightly more prominent. Fall had specimens from Colorado and Utah as well as from New Mexico.

Diplotaxis tristis Kirby

Figures 104, 222, 223

Diplotaxis tristis KIRBY, 1837, p. 130, pl. 5, fig. 3 ("in latitude 54°" [Canada]; lectotype, male, "North America," here designated from syntypes in British Museum, type locality here restricted to eastern Canada). FALL, 1909, pl. 1, figs. 13, 21 (clypeus, claw).

Diplotaxis corpulenta BURMEISTER, 1855, p. 263 (Pennsylvania; type not with Burmeister's other types of the genus in Halle, Germany).

DIAGNOSIS: Differs from *obscura* and resembles *atlantis* and *liberta* by having no hairs visible from above on the margins of the elytra, and by being found in the eastern, not the western, states (*obscura* occurs with *tristis* in Michigan and Illinois). *Diplotaxis atlantis* is a smaller species than *tristis* and has proportionately shorter elytra; it differs further from *tristis* by having the angles of the pronotum not at all depressed, the front angles not produced, and the labrum shorter. *Diplotaxis liberta* has the front angles much more acuminate than does *tristis*, and differs further by having very large, sparse, irregular punctures on the pronotum. *Diplotaxis tristis* resembles *obscura* and differs further from the two other species by having a long hollow labrum of the *brevicollis* type (fig. 100).

RANGE: Canada and northeastern United States, from latitude 54° N. south to New Jersey and Pennsylvania and west to Illinois and Minnesota in the Great Lakes region. Reported by Fall (1909, p. 48) from Junction City, Kansas. Approximately 125 specimens have been examined (see Appendix and fig. 104).

DESCRIPTION OF LECTOTYPE, MALE: Length, 11 mm. Color dark red. Head and clypeus combined nearly as long as pronotum.

tum. Head in front with a short, impressed, transverse line behind clypeus and behind this a slightly transverse swelling, head bi-impressed shallowly between eyes. Clypeal suture deep, distinct. Clypeus one-half of the length of head, more densely punctured than head, some punctures confluent, front margin shallowly emarginate between rounded angles, scarcely reflexed. Eyes, antennae, and mandibles as in *brevicollis*. Last segment of maxillary palpi not noticeably impressed. Labrum nearly a semicircle, deeply concave at middle (scarcely so in some), finely, densely punctured, almost twice as long at middle as reflexed under side of clypeus and projecting out from it. Mentum flat behind, not sunk at middle, declivous in anterior third, declivity concave from side to side, and posteriorly margined, arcuate, and pubescent.

Pronotum with punctures of disc somewhat sparser than those of head, distinctly impressed; base at center with short, longitudinal, impressed space; sides gently arcuate at middle to impressed and strongly produced front angles and to obtuse and impressed hind angles, sides of front impressed. Scutellum with two basal punctures. Elytra slightly rugose, punctures of same size as those on pronotum but sparser; costae flat but distinct, with row of smaller punctures; marginal hairs (of 70 specimens as well as of lectotype) not visible beyond epipleurae; reflexed margin as wide opposite last segments of abdomen as opposite hind coxae. Metasternum, pygidium, propygidium, front tibiae, and hind femora as in *brevicollis*. Middle tarsi with first segment longer than second, hind tarsi with it slightly shorter than second, hind tarsi as long as hind tibiae. Hind tibiae with strong setose carinae and apical flare. Claws bent angularly, cleft subapically, tooth shorter and slightly thicker than claw. Male genitalia of lectotype not dissected, but those of other males are similar to those of *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: The lectotype has the same male characters as given for *brevicollis*. Female characters are also like those of that species.

VARIATIONS FROM LECTOTYPE: The length of other specimens seen ranges from 12 to 14 mm.; the color, from dark red to black. There are many other variations: the last segment

of the palpi is flattened in many specimens, and the front of the clypeus is nearly straight; the labrum in some is not so long or so arched or so deeply concave as in the lectotype (in some it is scarcely longer than the reflexed under side of the clypeus); most specimens do not have the head or the clypeal suture impressed; the pronotum may have an impunctate median space and the front angles may be more blunt, less produced; the hind angles are not or scarcely impressed; the sides of the pronotum are nearly straight in most specimens; the scutellum may be impunctate.

REMARKS: This large species, the type of the genus, is so similar to the more western *obscura* that Kirby inadvertently made a specimen of the western species a syntype of *tristis* (the specimen is from British Columbia and bears an additional label reading "*consequens*," a species of Walker's which was said by Fall, 1909, to be a synonym of *obscura*). Kirby had "several specimens taken in Lat. 54°. Taken also in Nova Scotia by Capt. Hall." This latitude is north of Nova Scotia but includes Newfoundland in the east as well as British Columbia in the west. Kirby's description, as well as the small colored drawing, could apply to either species. It is because of this ambiguity that I have designated a lectotype. The pronotum is more constant in shape in *tristis* than it is in *obscura*, and a person who knows *tristis* can immediately recognize it in the area where both species occur (Michigan and Illinois). The difference, however, is not one that is readily communicable by description. In general, the pronotum is longer, less transverse, and the sides of the pronotum are not or but slightly arched in *tristis*, and the hind angles are usually flat, not depressed within, their apices rounded, not sharp. It is a larger species than *obscura* and has a more restricted distribution (see fig. 104).

Although *tristis* and *obscura* are difficult to separate, their geographic ranges generally serve to distinguish them. In collections, *tristis* is more often confused with either *liberta* or *atlantis* which occur also in the eastern states but extend farther south or farther west. Once recognized, these three species are readily separable (see diagnosis above). In his revision LeConte (1856, p. 267) mentions that Burmeister had placed *tristis* in syn-

onymy with *liberta*, but LeConte was quite right in stating that *tristis* is "distinct, having a thickly punctured thorax of a different form."

Although I have not seen the type of *corpulenta* Burmeister (Pennsylvania), and LeConte had not seen it (1856, p. 273), it was synonymized by Fall (1909, p. 93) in his list of species, without further comment.

Of the Kansas locality for *tristis*, Fall (1909, p. 48) says it is "exceptional, and it is probable that the species occurs very rarely so far west." Possibly this specimen is *obscura*, as it is now known that *obscura* occurs as far east as Michigan. On the other hand the eastern *atlantis* occurs as far west as Nebraska, Kansas, and Oklahoma.

Diplotaxis dahli Cazier

Figures 222, 223

Diplotaxis dahli CAZIER, 1940a, p. 251 (Coalinga, Fresno County, California; type, female, in the American Museum of Natural History).

DIAGNOSIS: This is the only species of the group with dorsal hairs on the elytra. It resembles *sierrae* very closely.

RANGE: Known only from the type locality in central California. The type and a male paratype from 7 miles west of Coalinga, Fresno County, March, 1940, have been examined.

HABITAT: The type and two paratypes were taken on *Juniperus californica* Carr at night.

DESCRIPTION: Length, 12 mm. Color black. The eyes, antennae, mandibles, maxillary palpi (distinctly impressed basally), metasternum, hind coxal plate, hind femora, and middle and hind tarsi are as described for *brevicollis*. Other characters of the two specimens examined follow: Head densely, confluent punctured and unevenly transversely depressed between eyes, also transversely tumid behind clypeal suture which is distinctly impressed. Clypeus about one-half of the length of head, punctured as on head, surface flat, shallowly reflexed in front where margin is slightly (paratype) or distinctly (type) emarginate between broadly rounded angles, sides not reflexed or sinuate, canthi not prominent. Labrum a little more than twice wider than long, scarcely punctured,

slightly convex in front, concave behind, slightly longer than reflexed under side of clypeus, front margin arcuate but not as the arc of a circle. Mentum flat, with declivity in apical fourth slightly concave from side to side, hind margin of declivity nearly straight, slightly margined and pubescent.

Pronotum not much longer than head and clypeus combined, punctures of disc of same size as those on head but uniformly dense without being confluent, center front with small impunctate area, center base narrowly creased; sides strongly margined, widest just behind middle, rather strongly arcuate to rectangular front and obtuse hind angles, angles not impressed. Scutellum densely punctured on sides. Elytra with hairs in interval and costal, but not in striae, punctures, hairs longer than one sutural interval is wide, elytra about three times longer than pronotum, punctures larger and sparser than those on pronotum; second interval with irregular double row of punctures; costae convex, with row of smaller punctures; marginal hairs at middle longer than scutellum. Abdomen on second and third segments with paired swellings or tubercles. Pygidium rather densely punctured. Front tibiae with third or basal tooth only slightly in front of middle, teeth very large. Claws curved gradually, tooth only slightly in front of middle, much shorter than claw. Male genitalia, including basal piece, like those of *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As given for *brevicollis*, except that there is little difference in the shape of the pygidium in the male and female examined.

REMARKS: This unusual species is almost exactly like *sierrae* (which occurs in Fresno County also, as well as in Nevada and elsewhere in California) in the head, clypeus, labrum, mentum, pronotum, abdomen, hind femora, marginal hairs, and claws, but *sierrae* has no dorsal hairs. *Diplotaxis dahli* is similar also to the glabrous *insignis* from California, but differs by having the mentum flatter, the declivity of the mentum margined, and the labrum longer, more arcuate in front. The only other large hairy species of the genus are in the *puberea* group (seven species), which occur from southern Durango, Mexico, south to Guatemala, and the *sordida* group (two

species) of the eastern United States. These species have no furrow on the under side of the clypeus as do *dahli* and the *brevicollis* group, and the species of the *puberea* group have much shorter and adpressed hairs on the elytra and hairy ventral pads on all the tarsi.

***Diplotaxis boops* Bates**

Figures 222, 223

Diplotaxis boops BATES, 1888 (1887-1888), p. 165 (Pinos Altos, Chihuahua, Mexico; type, female, in the British Museum).

DIAGNOSIS: This species at first glance is readily mistaken for either *parallela* or *dentella*, both of which, however, have the sides of the pronotum distinctly sinuate and the front angles more acute, as well as a dissimilar labrum. It differs further from *parallela* by having the under side of the clypeus furrowed, not virtually flat, and the marginal hairs of the elytra shorter, not longer, than the width of a sutural interval. Differs further from *dentella* by having the claw tooth in front of the middle, not median, and the second interval of the elytra with two or three rows of punctures.

RANGE: The mountains of southern Arizona south into Chihuahua and Durango in northwestern Mexico. Approximately 175 specimens have been examined (see Appendix).

DESCRIPTION: Length, 10 to 14 mm. Color black, occasionally dark red. Agrees with description of *brevicollis*, except as follows: head without depressions between eyes, and most specimens lack any post-clypeal convexity; front margin of clypeus either virtually truncate or with but a slight sinuosity in some specimens, the margin not reflexed more than width of border; labrum not so long at middle, nor so strongly arcuate (in some specimens labrum only slightly longer than reflexed under side of clypeus, but in most much longer); mentum with anterior declivity advanced in apical third but not strongly, slightly concave from side to side, its posterior edge rather sharp, but not visibly margined or pubescent (a few meager hairs present in some specimens); pronotal angles not impressed nor front angles drawn forward acutely, punctures in many specimens very sparse; scutellum with a few punctures; ely-

tra with punctures of same size and density as those of pronotum, marginal hairs sparse, shorter than width of one sutural interval, scarcely visible in some specimens; groove of propygidium not very deep or clear cut. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This species and *dentella* and *parallela* occur in about equal numbers in many parts of the state of Arizona. They are all approximately the same size and color, with similar rather sparse punctuation on the dorsum. The elytra, except on those specimens of *dentella* and *parallela* that have single rows of punctures in the second interval, are also similar. The head and clypeus are not very different, although the clypeus is emarginate in *dentella* and virtually truncate in the other two species. The head is flat in front in *parallela*, virtually without impressions, but in the other two species some specimens have an impression behind the clypeal suture or a slight post-clypeal convexity. The labrum of *boops* is actually of the *brevicollis* type (much longer at middle than at sides and nearly twice longer than reflexed under side of clypeus), not of the *haydenii* type as is that of the other two species (much wider than long, of same length throughout, front margin scarcely curved). A few specimens of *boops* have, however, a less curved and shorter labrum than others, yet appear in every other way similar (and the labrum is always longer than the under side of the clypeus). A few specimens of *boops* (as one of the 16 from Painted Canyon in the Chiricahua Mountains) have the pronotum somewhat sinuous on the sides, and the angles just perceptibly impressed, but not so markedly so as in *parallela*. The ridge of the mentum is worn and blurred in a number of individuals, so appears to be rounded off, not sharp. In any event, although the labrum is like that of *brevicollis*, *semifoveata*, *parvicollis*, *profunda*, and others, the mentum is pushed forward as is that of *haydenii*, *dentella*, *parallela*, and others.

The type and one or two other specimens are as large as 14 mm., but the majority are not quite so large. Although described from Chihuahua, Mexico, this species appears to be more common in the United States, where

it is restricted, so far as known, to the state of Arizona. On my visit to the British Museum to study the types, I could not find the second specimen mentioned by Bates from the city of Durango, but I have seen one from that city in the collection of the Senckenberg Museum in Frankfurt.

In the Fall collection at the Museum of Comparative Zoölogy there are two specimens of *boops* from Cochise County, Arizona, labeled, apparently by Fall, "n. sp. nr. *atlantis*." The two species are in fact very similar, as are most of this group, but the head surface and the pronotal punctuation differ, as well as the labrum and mentum. The labrum is never so long or so curved in front in *atlantis* as it is in *boops*, and the mentum is flat in *atlantis*, concave in *boops*.

SECTION 3 OF THE SPECIES GROUP *brevicollis-haydenii*

The majority of the species of the group are placed in this section, and they are typified by a very wide but short labrum that is shaped more or less like an elongated kidney bean (fig. 101) and by a mentum as given in the second part of couplet 9 in the key to the species (same kind of mentum as in section 2, *bakeri* and others).

Diplotaxis haydenii LeConte

Figures 101, 222, 223

Diplotaxis Haydenii LECONTE, 1856, p. 272 (Yellowstone River, Nebraska; two syntypes, male, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, figs. 13, 14 (clypeus, claw).

Diplotaxis innoxia LECONTE, 1856, p. 273, (Kansas; type, female, in the museum of Comparative Zoölogy).

Diplotaxis levicoxa FALL, 1909, p. 39, pl. 1, figs. 13, 14 (Stockton, Utah; type, female, in the Museum of Comparative Zoölogy). New synonymy.

Diplotaxis impressifrons CAZIER, 1940c, p. 127 (Cedarville, Modoc County, California; type, female, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: No matter what the size or color, this species can be recognized among others of the group by the following combination of characters: truncated clypeus; short wide labrum; mentum declivous in front and jutting out, but its declivity not margined

posteriorly; front of head either slightly or strongly transversely tumid; very long marginal hairs; medially toothed claws; acute front angles of the pronotum and impressed furrow along sides of front margin; and (except in California and Nevada) virtually impunctate hind femora.

RANGE: Western United States from the western part of North and South Dakota, Nebraska, Kansas, and Texas west to eastern California and south into northern Chihuahua, Mexico. No specimens have been seen, however, from the states of Oklahoma, South Dakota, or Washington. About 250 specimens have been examined (see Appendix).

HABITAT: The type and paratypes of "*impressifrons*" were "collected by beating juniper at night" in May, 1939, at Cedarville, California. A female from 12 miles east of Cedarville (in Nevada) also was taken on juniper by W. F. Barr in June of 1946, and a specimen taken in August, 1955, by R. F. Koontz at Panaca, Nevada, was from "piñon pine and juniper forest."

DESCRIPTION: Length, 8 to 14 mm. Color tawny, dark red, or black. Agrees with the description of *brevicollis*, except as follows: punctures of head in most specimens dense and touching except in front of convexity (not always present) where are lacking or sparsely punctured; clypeus with suture straight, from one-third to one-half of the length of head, its front margin truncate (an occasional specimen with a slight emargination at center), rounded off on sides, narrowly or broadly, and evenly reflexed throughout, surface tumid at center in some specimens, angles not at all prominent; canthi angulate in some specimens; labrum at least three times wider than long, convex in front, concave at middle rear, no longer at middle than at sides, either shorter than, or same length as, under side of clypeus, front margin nearly straight or only slightly arcuate; mentum declivous in apical third or fourth, the declivity virtually flat, its rear edge sharp and advanced from rest of mentum, but not truly margined, and with a few sparse hairs (not usually visible); pronotum with punctures of disc impressed, of same size as those on head but either sparser or equally dense, the front angles small and acute, in some specimens distinctly drawn forward, front and hind angles

in some specimens shallowly depressed within, sides of front margin transversely depressed; scutellum impunctate in all but several specimens; elytra a little more than three times longer than pronotum, punctures slightly larger and somewhat sparser (in some specimens denser), punctures of costae and suture in some specimens small but not minute; marginal hairs at middle nearly as long as scutellum, elytra shining or rather opaque, in some rugose; abdomen in some grossly tumid on one or more segments; pygidium in a few specimens sparsely punctured; claws very long, with tooth about midway between apex and base, tooth short. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: Same as in *brevicollis*.

REMARKS: One might add to the diagnosis above that many examples of this species have one or more of the segments of the abdomen tumid on each side of the middle, and the hind coxae impunctate. These characters, however, are not constant, and the first one occurs also in other species of the group (*brevicollis*, *insignis*, *dentella*, and others). As for the hind coxae, although they are virtually impunctate in many specimens, as stated by Fall (1909, p. 40) for "*levicoxa*," I have seen a specimen, for example, from Bernalillo County, New Mexico, in which there are only six or seven punctures on one hind coxa, but twice that many on the other coxa.

Of the other species of the group with more or less truncated clypeus, three (*aequalis*, *atlantis*, *boops*) differ from *haydenii* by having short marginal hairs and non-acute front angles of the pronotum; *parallela* differs by having distinctly apically cleft claws; *sierrae* (clypeus, however, usually emarginate) differs in its well-punctured hind femora and non-acute pronotal angles; *residua* (similar to but not in this group) by having non-acute pronotal angles and reduced wings; and some *insignis* (which, however, have the clypeus emarginate in most specimens) by having very dense and tiny punctures on the front of the head and less acute pronotal angles. Another species that might be confused with *haydenii* because of its similar pronotum (acute front angles, sinuate sides, sparse punctuation) and claws is *dentella*, which differs by having the clypeus emarginate, the marginal hairs short, and the front of the

head smoothly rounded, not tumid or declivous in front. It must be stated here that a few specimens of *haydenii* have the clypeus slightly emarginate; I have seen two such from Apache County and one from Williams in Arizona, and one of a pair from Juab County, Utah; all these have the characteristic long marginal hairs and median claws of *haydenii*.

Although all the various forms synonymized with *haydenii* in this paper have the clypeus truncate, the claws medially toothed, the marginal hairs long, and the labrum, mentum, and male genitalia similar, they differ throughout the geographic range in other characters, such as size and color; depth and density of punctuation (on pronotum, hind coxae, hind femora, metasternum, and head); sharpness of the front angles of the pronotum; degree or absence of post-clypeal convexity on the head; length of the clypeus; and presence or absence of swellings on the abdomen. Both *haydenii* and "*innoxia*" (synonymized with *haydenii* by Fall, 1909) were described from small, tawny, sparsely punctured specimens from Nebraska and western Kansas that had the pronotal angles strongly produced forward and acute, the sides of the pronotum strongly arcuate, the hind coxae somewhat punctured, the head very tumid, the abdominal segments not tumid, and the clypeus about one-third of the length of the head. Such specimens I have seen from the states mentioned, also from Colorado, Wyoming, Montana, New Mexico, and Utah, but all the characters are not so definite as stated. The type of "*levicoxa*" (Utah) is also tawny, with acute pronotal angles and sparse punctuation, but it is larger, has the abdomen strongly tumid at center, the clypeus somewhat longer, and the hind coxae virtually impunctate. The majority of specimens of this kind are, however, dark in color, often black; they have been examined from Utah, Arizona, New Mexico, Nevada, and California. From Modoc County in extreme northern California, a third form ("*impressifrons*") was described on a good series (26), and these, as also a series from the adjacent county of Siskiyou, are small and dark and agree with the first forms mentioned above by having the hind coxae punctate and the abdomen rarely tumid (in only three specimens of 50), yet they differ from all the forms mentioned (not

all the individuals) by having the punctuation of the pronotum dense, the front angles of the pronotum not quite so narrowly acute or produced, and the front of the head tumid in fewer specimens.

One wonders if there may not be subspecies involved here, but, if so, I do not know how the geographic limits of each could be defined. Also many characters vary as much within populations as between those from the east and those from the west. Thus of two specimens from Eureka, Utah, one has the hind coxae impunctate, one has a few punctures; of 11 large specimens from Malto, Idaho, and 10 from Santa Fe, New Mexico, some are tawny and some dark, the coxae punctate or not, the abdomen tumid or not. The two series of "*impressifrons*," although nearly constant in having the abdomen not tumid but the hind femora and coxae punctured and the pronotum densely punctured, vary in the tumidity of the head and in the sharpness of the front pronotal angles. Nine specimens from Nevada and from Plumas, Lassen, and Sierra counties in California agree fairly well with the "*impressifrons*" series, but have the pronotum either densely or sparsely punctured and the pronotal angles sharp or less sharp; some are tawny and larger than "*impressifrons*." A single specimen from northern Chihuahua, Mexico, has the pronotum and abdomen as in "*impressifrons*" but the pronotal front angles as sharp and drawn forward as are those in typical "*levicoxa*" or *haydenii*. There are, however, three series that are quite uniform: 24 specimens from Vernon, Arizona, 12 from the Grand Canyon, Arizona, and 12 from Gallup, New Mexico, all with the abdomen tumid (in six very strongly so), the hind femora impunctate, and (with eight exceptions) the hind coxae also impunctate. Even in these, however, the head is not tumid in all, nor the color always dark.

Diplotaxis sierrae Fall

Figures 105, 175

Diplotaxis sierrae FALL, 1909, p. 45, pl. 1, figs. 13, 17 (Placer County, California; type, female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: The densely punctured hind femora between the submarginal rows of punctures and/or the not at all acute front angles of the pronotum and the non-im-

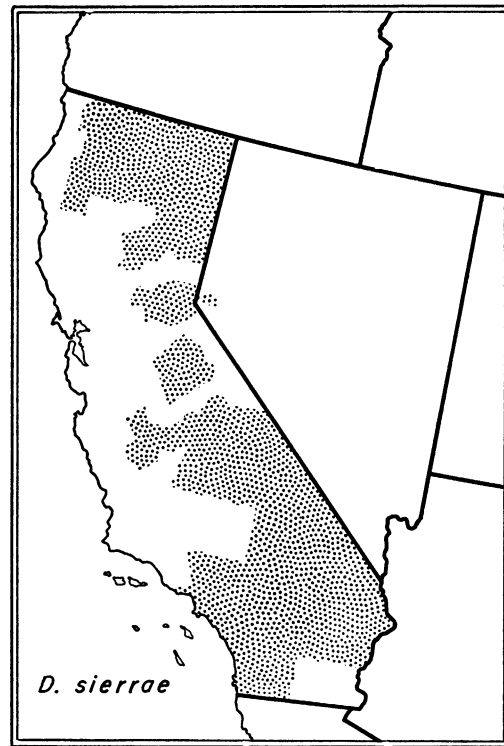


FIG. 105. Distribution of *Diplotaxis sierrae* in the counties of Nevada and California.

pressed hind angles distinguish this species from the other similar large glabrous species in California and vicinity with the mentum not hollowed out (*insignis*, *obscura*, *haydenii*).

RANGE: Western Nevada and almost all the state of California (except the extreme west coast north of Los Angeles County), mainly in the mountains. About 160 specimens have been examined (see Appendix and fig. 105).

DESCRIPTION: Length, 11 to 14.5 mm. Color dark red to black. Agrees with description of *brevicollis*, except as follows: head punctured in front of post-clypeal convexity, punctures of head touching one another; clypeal suture obliterated at middle in some specimens; clypeus in some specimens with slightly tumid areas at sides or at middle, in some front margin scarcely emarginate; labrum finely punctured, slightly concave at middle, front margin arched in front but not as in an arc of a circle except in a few specimens, length at middle variable, same length as, slightly longer than, or much longer than under side of clypeus, front of labrum level

with or advanced from under side of clypeus; mentum rather flat, its declivity in apical fourth indicated by sharp truncate hind edge with a few sparse hairs, surface flat or slightly concave; pronotum with punctures of disc nearly as dense as those on head, sides strongly arched, almost bulging at middle in some specimens, in some sinuate at base, very strongly margined, angles not acute or depressed, center in some with impressed line; scutellum punctured at sides or base; elytra about three times longer than pronotum, punctures larger and sparser than on pronotum, second interval with two rows of punctures, costal and sutural intervals with punctures small, but not minute, some punctures confluent; marginal hairs at middle at least as long as scutellum. Male genitalia as in figure 175 of *sulcatula*; basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *brevicollis*. The hind femora of the females are twice as wide as those of the males, and females have broader front tibiae.

REMARKS: This coarsely punctured species, though rather distinct in the group because of the characters of its pronotum and male genitalia, varies considerably in several characters. These are the labrum, which may be as long, as arched in front, and as hollow as that of typical *brevicollis*, or almost as short, as straight in front, and as slightly concave as that of typical *haydenii*; the sides of the pronotum, which vary in the degree of curvature and sinuosity; and the mental declivity, which is rather advanced in some specimens, quite flat in others, and in some specimens from Indio, California, is even slightly hollow and sunken (the labrum is also longer than usual in these specimens).

The eighth sternite in this species is much wider and larger than in others of the group.

Although distinct from *insignis*, which occurs in some of the same counties of California (Inyo, San Bernardino, Riverside, San Diego, Los Angeles, and Fresno counties), this species is very similar in the general appearance and size. A few females of *insignis* have been seen with almost as many punctures on the hind femora as *sierrae*; and one individual of *sierrae* has been seen with virtually no punctures. Other differences between these two species are: *sierrae* has the tarsal claws toothed somewhat farther front,

not so distinctly median, the head generally more sharply tumid in front, the declivity of the mentum flat, not pushed forward as is that of *insignis*, and its rear edge sharp, not rounded off or convex, the labrum in many specimens longer at the middle and more arched than that of *insignis*.

Diplotaxis insignis LeConte

Figures 222, 223

Diplotaxis insignis LECONTE, 1861, p. 346 (Salt Lake Desert [northwestern Utah]; type, male, in the Museum of Comparative Zoölogy). FALL, 1909, pl. 1, figs. 13, 14 (clypeus, claw).

Diplotaxis falli SAYLOR, 1935, p. 35 (Victorville [San Bernardino County], California; type "in the collection of the author," now in the California Academy of Sciences). New synonymy.

DIAGNOSIS: Very similar to *sierrae* and *haydenii*, differing from the former as stated under that species, and from *haydenii* by having the clypeus at middle emarginate, not straight (although in a few specimens there is not much difference between the two forms in this respect), and the front of the head always uniformly densely punctured behind the clypeus without the abrupt and sparsely punctured or impunctate declivity present in most specimens of *haydenii*. The punctuation of the pronotum is generally denser in *insignis*, but not denser than some of the California and Nevada populations of *haydenii*, a species with a far wider range.

RANGE: Western Nevada, southern Idaho, northwestern Utah, and almost all the state of California. Approximately 90 specimens have been examined (see Appendix).

HABITAT: According to Cazier (1940a, p. 252), this species ("*falli*") has been "collected on the same host at the same locality during the same season" as *dahli*, of which the host is *Juniperus californica*, and the locality where both were taken together is Coalinga, Fresno County, California.

DESCRIPTION: Length, 11 to 15 mm. Color dark red to black. Agrees with description of *brevicollis*, except as follows: head with entire surface punctured very densely, especially the front where some punctures are confluent, frontal impressions or punctured declivity vaguely defined or absent in some specimens; clypeal suture obliterated at middle in a few specimens, but deeply marked in most; clyp-

eus with front margin only slightly emarginate in some specimens (virtually truncate in type of *insignis*), sides sinuate and canthi prominent in some; palpi actually impressed; labrum concave at middle, three times wider than long, not or scarcely longer than under side of clypeus, front margin scarcely curved; mentum at middle not sunk, but advanced from base to declivity in apical third or fourth, declivity with surface flat, and posterior edge sharp or rounded off, but not margined or pubescent; pronotum deeply coarsely punctured, punctures of disc sparser than those of head, many specimens with a center impunctate space or a center crease of concentrated punctures, sides widest at or behind middle, strongly arcuate in most specimens, scarcely so in others, and slightly sinuate in still others, front angles acute but small, slightly impressed, hind angles obtuse but sharp; scutellum with one or several punctures; elytra about three times longer than pronotum, punctures sparser than those of pronotum, marginal hairs at middle as long as scutellum; claws curved gently, tooth about midway between apex and base of claw. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: LeConte's species was described from a unique specimen from Utah (examined by me) which has the clypeus nearly truncate in front, but other specimens, agreeing with the type in the cluster of dense punctures on the frontal convexity of the head and in other characters, have the clypeus emarginate, either slightly or strongly (as do most of a series of 17 specimens from Blancos Corral, White Mountains, Mono County, California). Another form (*falli*) described from farther south (Victorville, San Bernardino, California) apparently has the clypeus distinctly emarginate and the front of the head somewhat less densely punctured and less tumid. (I have not seen the type, but have seen 17 specimens from Coalinga, two of which have been compared with the type by Mont A. Cazier.) Between these two forms, however, there are all gradations in size, coloration, the shape and punctuation of the pronotum, and the depth of the clypeal suture, although the male genitalia, hind femora (punctuation), mentum, labrum, depression of the metasternum, and claws are

almost alike in all. I believe that this species, as is *haydenii*, is one variable form and that it includes *falli* as a synonym. Although Saylor remarks that his *falli* is closely allied to *insignis*, he makes no further comparison; instead he compares it with *sierrae* which occurs in many of the same counties of California as *insignis* (see *sierrae* for comparison). In general, the black specimens with sparser punctuation, more emarginate clypeus, and less tumid or non-tumid head ("*falli*") occur in the western and southern parts of California, whereas the reddish ones with denser punctuation, less emarginate clypeus, and very densely punctured, tumid head occur in Mono and Inyo counties in the east, and in Nevada and Utah (*insignis*). Whether these forms are subspecies or not may be established by further knowledge of their habits and by additional series of specimens.

Although occurring in a different area from *dentella*, *insignis* is very similar to it in general appearance and in the claws, labrum, and mentum, but differs in the much longer marginal hairs.

Diplotaxis dentella Fall

Figures 222, 223

Diplotaxis dentella FALL, 1909, p. 41, pl. 1, fig. 13 (Fort Grant, Arizona; type in the United States National Museum).

DIAGNOSIS: Resembles *boops* and *parallela* (also common in Arizona), but these species differ by having the front margin of the clypeus truncate, not emarginate, and the tarsal claws subapically cleft, not medially toothed, and more strongly curved. Very similar also to *haydenii* (similar claws, labrum, mentum, and pronotum angles), but differs also in the emarginate clypeus, and by having short, sparse marginal hairs (no longer than a sutural interval is wide), and the front of the head flat or regularly convex, not transversely tumid. (See also comparisons under remarks.)

RANGE: Arizona, southwestern New Mexico, and extreme northern Sonora (Naco, just south of Bisbee, Arizona). About 400 specimens have been examined (see Appendix).

HABITAT: A specimen from Cochise Stronghold, Dragoon Mountains, Cochise County, Arizona, collected in July, by F. W. Werner, was taken on juniper.

DESCRIPTION: Length, 9.5 to 13 mm. Color black, only occasional specimens reddish. Agrees with description of *brevicollis*, except as follows: head with surface flat and even (a few specimens with depressions between the eyes or slight post-clypeal convexity), densely punctured (punctures touching); clypeus in some specimens with front margin only slightly emarginate, nearly truncate, and shallowly reflexed (by about the width of margin itself) at center, more reflexed behind rounded angles; labrum at least three times wider than long, concave at middle where it is no longer than at sides or than under side of clypeus, front margin nearly straight or only slightly arcuate; mentum declivous in apical third, declivity flat, its rear edge convex, rounded off, not sharp and advanced from rest of mentum, not margined or pubescent; pronotum with angles not broadly depressed, some specimens with punctures deeper and denser than others; elytra about three times longer than pronotum, second interval in majority of specimens with a single, perhaps irregular row of large punctures at base or throughout, interspersed with a few tiny punctures, some specimens with two rows of punctures; marginal hairs not longer than width of one sutural interval; claws with tooth distinctly median in position, even slightly nearer base in some, tooth very short. Male genitalia, including basal piece, as in *brevicollis* (figs. 222, 223).

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: The majority of individuals of this species differ from other species of the group by having a single row of large punctures on the second elytral interval, but this character is not entirely constant, a small number of specimens having two rows. In addition, a few individuals of the very similar *parallela* have but one row, as do most specimens of *dentella*. The sides of the pronotum, however, seem to be quite constant in their rather strong arcuation at the middle and almost sinuate extension to the front and hind angles, the former being acute in all, in some slightly depressed.

In addition to the species mentioned in the diagnosis, two others are very similar to *dentella*: *statura* Cazier from Coahuila, Mexico, and Texas, and *ungulata* Cazier from Texas and Arizona, two uncommon species that

seem to differ from *dentella* in the legs only, the former species (only females known) having the hind femora much wider (wider than the length of the second abdominal segment), and the latter (only males known) having the legs very long and thin, the hind tibiae nearly straight, scarcely flared out at the apex (see remarks under *ungulata*).

Fall compared his *dentella* with *brevicens* which, as he says, is a very different species. Among other characters, it differs from *dentella* by having small, thin mandibles, the mental declivity margined and pubescent, the pronotum very large and long (much longer than head and clypeus combined), and the males with very hairy abdomen and hind legs.

Viewed from above, *dentella* resembles closely an abundant Texas species that comes into eastern Arizona, *belfragei*, which differs, however, by having the labrum long and hollow as in *brevicollis*, not wider than long as in *dentella*, and the mentum with a concave, not flat, declivity.

Diplotaxis ungulata Cazier

Figures 222, 223

Diplotaxis ungulatus CAZIER, 1940c, p. 132 (White Mountains [Apache County], Arizona; type, male, in the American Museum of Natural History).

DIAGNOSIS: This form may be the male of *statura* (see remarks below). Otherwise it resembles *dentella* closely, but differs by having a feeble, if any, furrow present on the under side of the clypeus; males of *ungulata* differ by having longer, narrower legs and claws, the hind tibiae scarcely flared out apically, and the hind tarsi longer than the tibiae by at least one segment.

RANGE: The only specimens known are the type from eastern Arizona, a male from Galinas Park, Lincoln County, New Mexico, and a male from Marathon, western Texas, June 14, 1948.

DESCRIPTION (MALES ONLY): Length, 10.5 to 12.5 mm. Color black or dark red. Agrees with description of *brevicollis*, except as follows: head with surface flat and even, rather densely punctured in front, but with sparse punctures behind clypeus; clypeal suture straight and deep; clypeus with front margin only slightly emarginate; labrum and men-

tum as given for *dentella* (which precedes), except that under side of clypeus is flat (type) or feebly furrowed; pronotum with angles not depressed, front angles not acute or drawn forward; elytra about three times longer than pronotum, second interval with two or three rows of small punctures (two specimens, including type), or one irregular row of large punctures (one specimen), marginal hairs shorter than a sutural interval is wide; pygidium very large, flat; claws very long, tooth very short, distinctly median in position, even slightly nearer base than apex. Genitalia as in figures 222 and 223 of *brevicollis*, but proportionately stouter and basal piece very slightly longer than lobes.

SEXUAL DIMORPHISM: No females available for comparison.

REMARKS: Although the male from Marathon, Texas, differs slightly from the type (Arizona) and the male from New Mexico (size larger, head and pronotum more densely punctured, vague furrow on under side of clypeus, hind tibiae somewhat flared out apically, second interval of elytra with one irregular row of punctures), it appears to be the same species. It was taken, however, at the same time and place as were three females of *statura* (described from Coahuila, Mexico) and is so similar, except for the secondary sexual characters of the femora and tibiae, that it seems highly probable that *statura* is the female of *ungulata*. On the other hand, examination of additional specimens of both sexes may show that there is a female with narrower, more parallel-sided hind femora to match *ungulata* males, or a male with wider, more bulbous hind femora to go with *statura* females. It seems best to keep these forms separate for the present, because the few specimens available are not sufficient on which to judge the degree of individual variation.

There is still a further possibility, i.e., that *statura* with its wide femora (perhaps wide in both sexes), is a good species, but that *ungulata* is the same as *dentella*, the latter not yet known from Texas. A few males of *dentella* have the tarsi and claws as long as those of *ungulata* (though the majority have them shorter), and both forms vary in the punctuation of the second elytral interval. The clypeus and head are similar, but the pronotal sides are less sinuate in *ungulata* and have the

front angles more right-angled than acute. Perhaps additional specimens from the vicinity of Marathon may solve the problem of relationships between these forms.

I have seen two specimens of *haydenii* also from Marathon, same date, which have the long legs and claws of *ungulata* but which differ by having the clypeus truncate and the marginal hairs as long as the scutellum.

***Diplotaxis statura* Cazier**

Diplotaxis statura CAZIER, 1940b, p. 143 (Buena Vista, Sierra de la Encantada, Coahuila, Mexico; type, female, in the American Museum of Natural History).

DIAGNOSIS: This may be the female of *ungulata* (see remarks under that species, which precedes). The female differs from *dentella* by having the sides of the pronotum evenly arcuate, not sinuate; the hind femora rather bulbous, wider than the second segment of the abdomen is long and rather strongly emarginate near apex; the unguis tooth nearer base than middle of claw. (See diagnosis of *completa* for comparison with that species.)

RANGE: Northwestern part of Coahuila and western Texas. Only six specimens (all females) have been examined, as follows: two from Fort Davis, Texas, September 15, 1930; three from Marathon, Texas, June 14, 1948; and the type from Buena Vista, Coahuila, July, 1938. On the locality label of the type the words "Sierra de la Encantada" have been crossed out with a pen, evidently because Buena Vista (or Buenavista) is farther to the west of this sierra, according to the map of Hispanic America (American Geographical Society, 1945).

DESCRIPTION (FEMALES ONLY): Length, 10 to 12.5 mm. Color dark red or black. Agrees with description of *brevicollis*, except as follows: head with surface flat and even, rather densely punctured in front, but with sparse area behind clypeus in some specimens; clypeal suture straight; clypeus with front margin only slightly emarginate in five of six specimens; labrum and mentum as given for *dentella*, but under side of clypeus flat in some specimens; pronotum with angles not depressed nor front ones noticeably drawn forward; elytra about three times longer than pronotum; second interval with two rows of large punctures or one irregular row; marginal

hairs shorter than a sutural interval is wide in the few specimens examined; pygidium flat; hind femora wider than length of second abdominal segment, lower margin gently arcuate; claws long, with tooth distinctly median in position, even slightly nearer base than apex, tooth very short.

SEXUAL DIMORPHISM: No males available.

REMARKS: The very large hind femora may be a character of the female only and not of the species, but until the male is known, this cannot be determined. As is true also of *ungulata*, *statura* is very similar to *dentella*; in fact, one of the two specimens examined from Fort Davis, Texas (in the collection of Cornell University), was identified by Fall as *dentella*, with the added notation "not quite typical." So far as known, *dentella* does not occur in Texas, though it may well be found there. I have seen also a specimen of *dentella* from Miami, Arizona, identified by Cazier as *statura*. These examples show how similar these forms are and how readily they can be confused. I believe, however, that the wide hind femora are sufficient to separate this form from *dentella*.

***Diplotaxis completa* Cazier**

Figures 101, 106, 222, 223

Diplotaxis completa CAZIER, 1940b, p. 141 (Serranias del Burro, Coahuila, Mexico; type, male, in the American Museum of Natural History).

DIAGNOSIS: Resembles, from above, *bakeri*, *belfragei*, and *dentella*, and in some respects also *ungulata* and *statura*. Differs from the first two species by having the labrum wide and short (fig. 101), not long and concave at

the middle; differs in 95 per cent of instances from all five in two ways, either by having the front of the head behind the clypeal suture transversely tumid or declivous (a few *belfragei* have this character also), or by having this area either impunctate or with sparser punctures than the rest of the head. (See other comparisons below.)

RANGE: Zacatecas, Durango, eastern Chihuahua, and northwestern Coahuila in Mexico into adjacent Brewster County, Texas; also Crockett County slightly north and east. A total of 99 specimens has been examined, most of them from Mexico (see Appendix and fig. 106).

HABITAT: About 50 specimens were taken at night "On Juniper" at El Tascate, Durango, 6400 feet, July 28, 1947, by members of the David Rockefeller expedition to Mexico.

DESCRIPTION: Length, 9 to 13 mm. Color black or dark red. Agrees with description of *brevicollis*, except as follows: head not so finely punctured; clypeal suture straight; clypeus with front margin only slightly sinuate in many specimens and truncate in four or five; labrum and mentum as in *dentella*; pronotum with sides strongly arcuate, angles not broadly depressed within; elytra about three times longer than pronotum, marginal hairs longer than one sutural interval is wide; pygidium in some specimens sparsely, not densely, punctured; hind femora slightly wider than second abdominal segment is long in a few specimens. Male genitalia about as in *brevicollis* (figs. 222, 223), but basal piece same length as or longer than lobes.

SEXUAL DIMORPHISM: As in *brevicollis*, ex-

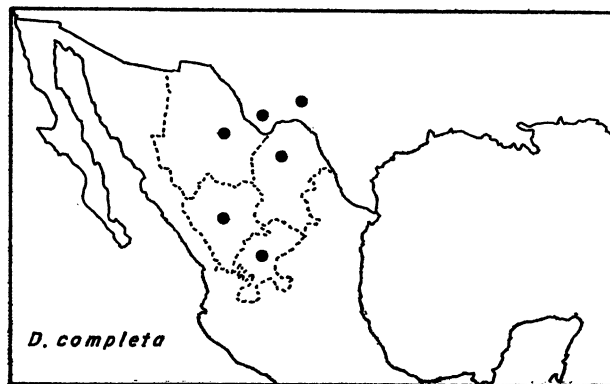


FIG. 106. Distribution of *Diplotaxis completa*.

cept that males as well as females have the hind tibiae flared out at the apex.

REMARKS: So far as known, *dentella* does not come in contact with *completa*, but the other species mentioned in the diagnosis occur or may occur together with *completa* in the Big Bend and Chisos Mountains area of southwestern Texas, and in northern Coahuila. These other species, however, have not been seen from farther west, in Durango, Zacatecas, or Chihuahua. *Diplotaxis unguolata* (known from males only) has the middle and hind legs and the claws longer and thinner than does *completa*. The hind femora of females of *completa* are almost but not quite as stout as those of *statura* (known from females only), which differs by having the front of the head flat and uniformly punctate and the second elytral interval with only two rows of large punctures.

There are many inconsistencies in regard to the species mentioned above and *completa*. Thus one of four specimens of *completa* from Juniper Canyon in the Chisos Mountains and one of six from Zacatecas have the front of the head densely punctured as is that of *statura* and the other species mentioned. On the other hand, the type of *stabilis* (= *belfragei*) has the front of the head sparsely punctate as is that of *completa*. The species *belfragei* and *completa* both vary by including specimens with the tooth of the claws either median or subapical, specimens with the front of the head tumid instead of flat, and even with the declivity of the mentum more advanced or longer or shorter in some specimens.

The tumidity of the front of the head, present in all but one of the specimens from Texas and Coahuila, is more variable in the material from the more western Mexican states. Thus most of the specimens from El Tascate, Durango, have the front tumid, but some (and also the majority from Nombre de Dios) have it smooth. In nearly all specimens, however, including those with the head smooth, the transverse area behind the clypeal suture is less punctate than the rest of the head, or impunctate. Of six females from Zacatecas, only two have the head tumid; the others have the entire head sparsely punctured, or the front densely punctured (one specimen), or depressions between the eyes that form a slight tumidity in front (two specimens). Two individ-

uals have a slight tumidity at the base of the clypeus, as is present also in two from Nombre de Dios. The tooth of the claws appears to be more median and the elytral marginal hairs longer in the specimens from Chihuahua than are those in specimens from all the other localities, but as the other characters appear to be the same or to vary in the same way, it is assumed that these are also *completa*.

A specimen from Ozona, Texas, and seven of the females from El Tascate have the front margin of the clypeus virtually truncate, as is that of *haydenii*, a species with the head, labrum, and mentum quite similar to those of *completa*, but which differs by having very long marginal hairs, longer clypeus, the claws always with a median tooth, and, except for northern Chihuahua, a more northern geographical range.

Diplotaxis parallela Fall

Figures 222, 223

Diplotaxis parallela FALL, 1909, p. 46, pl. 1, figs. 13, 17 (Dripping Spring, Organ Mountains [Dona Ana County], New Mexico; type, female, in the Museum of Comparative Zoölogy).

Diplotaxis parkeri CAZIER, 1940c, p. 133 (Pinal Mountains [Gila County], Arizona; type, female, in the American Museum of Natural History). New synonymy.

DIAGNOSIS: This long narrow species differs from other similar species of the group with the labrum much wider than long that occur in Arizona (*aequalis*, *boops*, *dentella*, *haydenii*) or in New Mexico (*belfragei*) in one or more of the following characters: long, truncate clypeus; shallowly impressed or explanate hind angles of the pronotum, acute front angles, sinuate sides; short, sharply delimited declivity of the mentum; apically cleft and angularly bent claws, and usually flat (not furrowed) under side of the clypeus.

RANGE: New Mexico and Arizona. A specimen from Los Pinos [Conejos County], southern Colorado, was reported by Fall (1909, p. 46) to be in the collection of the United States National Museum. A male from Medina County, Texas (near San Antonio), has been examined by me, but I question this locality for this species, especially because a specimen of another species (*marginicollis*), which also is not otherwise known from Texas, has been examined from the same locality. About 200

specimens have been examined (see Appendix).

HABITAT: Specimens from New Mexico (according to data supplied by C. Clayton Hoff) were collected in litter beneath juniper and from Berlese material in pinyon and juniper woods.

DESCRIPTION: Length, 10 to 12.5 mm. Color black, occasionally dark red. Agrees with description of *brevicollis*, except as follows: head with surface flat and even (a few specimens with a vague depression between the eyes), densely punctured with touching punctures; clypeus about one-half of the length of head (more in some specimens), front margin truncate, reflexed in some specimens by not more than width of margin; labrum scarcely, if at all, advanced from under side of clypeus (the latter flat in many specimens), about three times wider than long, concave at middle where it is not longer than at sides or than under side of clypeus, front margin curved gently; mentum declivous in apical third or fourth, declivity flat, its rear edge sharp (distinctly margined in types of *parallela* and "*parkeri*" and some others, but often worn), advanced from rest of mentum, pubescence not noticeable; pronotum with hind angles shallowly and broadly impressed, front angles scarcely or but narrowly impressed; scutellum with few or many punctures; elytra with second interval in a few specimens irregularly unipunctate, but in most with two or three rows of punctures; pygidium sparsely punctured in many specimens; claws bent abruptly, toothed near apex, tooth shorter than claw. Male genitalia as in *brevicollis* (figs. 222, 223), but basal piece distinctly longer than lobes and apices not at all widened.

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: The species that seems to agree with the majority of characters given for *parallela* in the diagnosis is one (*aequalis*) that resembles it the least. Both species, however, differ from others of the group by lacking, except in a few specimens, the usual furrow on the under side of the clypeus, this area being flat and level with the front of the labrum. *Diplotaxis aequalis* (which is rare in collections) differs further from *parallela* by being larger (12 to 14 mm.), bulkier, not so shining of surface, and by having the front of the

head distinctly bi-impressed in most specimens and the pronotal sides virtually parallel in the basal half.

The material examined (200 specimens) is fairly uniform, although the elytral punctuation varies. Only one individual has been seen with a slight emargination of the normally truncate clypeus; and one with the pronotum rather densely and coarsely punctured and the angles more deeply impressed than usual. Several individuals, however, have only one irregular row of punctures on the second interval of the elytra, as in the type of *parkeri* (Pinal Mountains). These individuals are from the Sierra Ancha Mountains (two of three specimens) and Flagstaff, the Grand Canyon, and Prescott, Arizona (one each). Three of the 100 or so specimens from the Chiricahua Mountains and vicinity have this interval sparsely punctured, although not quite unipunctate. As the male genitalia and other characters appear to be similar in these specimens as in others, and as *dentella*, a quite similar species, shows the same variation in the punctuation of this interval (although in reverse, the single row specimens being in the great majority), I consider *parkeri* to be a synonym of *parallela*.

Diplotaxis aequalis Cazier

Figures 222, 223

Diplotaxis aequalis CAZIER, 1940c, p. 129 (Globe, Arizona; type, female, in the American Museum of Natural History).

DIAGNOSIS: Distinguishable from other large species of the group by having a very long clypeus (almost as long as the head) with truncate front edge and flattened surface, and a long, flattened, not convex, pronotum that is strongly widened to the basal angles (base wider than apex), which are shallowly depressed and explanate. The declivity of the mentum is short, flat, ridged behind; the labrum is concave, wide, but no longer than the under side of the clypeus; the claws are distinctly bent and toothed at the apex.

RANGE: Arizona. A total of 19 specimens has been examined from 10 localities in the state (see Appendix).

DESCRIPTION: Length, 12 to 14 mm. Color dark red to black. Agrees with description of

brevicollis, except as follows: head with surface either flat or bi-impressed, punctures touching; clypeus nearly as long as head, punctured as on head, front margin straight, slightly, shallowly reflexed, canthi prominent in some specimens; labrum punctured, concave, gently arched in front, about three times wider than long, same length at middle as reflexed under side of clypeus (the latter flat in a few specimens), and scarcely advanced from it; mentum not sunk at middle but with a short, flat declivity in apical third or fourth that is posteriorly ridged, virtually truncate, and pubescent; pronotum with punctures of disc impressed, of same size and nearly as dense as those on head, center in some specimens with a small punctured depression, sides at base nearly parallel and strongly oblique to front angles which are not acute, hind angles bluntly right-angled and slightly depressed within; scutellum impunctate; elytra in some specimens rather opaque and rugose and the punctures partially confluent, costae convex; claws bent abruptly, toothed at apex, tooth as long as and wider than claw and pressed close to it. Male genitalia about as in *brevicollis* (figs. 222, 223), but apices not at all widened, and basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This species, which is rather distinct because of its long flattened clypeus and basally widened pronotum, is apparently restricted to the state of Arizona. It is similar to *parallela* Fall, another western species, and to *atlantis* and *tristis*, eastern species. The head, clypeus, and claws are like those of *parallela*, but the latter has the sides of the pronotum sinuate and converging to base, the front angles acute, and the labrum proportionately wider. The pronotum of *aequalis* is similar to that of *tristis*, and the labrum is nearly so, but the mentum of *aequalis* is flat, not concave, and the clypeus is not emarginate as it is in *tristis*. The labrum, mentum, and the truncate front edge of the clypeus are like those of *atlantis*, but the clypeus is much longer in *aequalis*, and the pronotum and geographic range differ. In addition to *parallela*, another species from Arizona with straight-edged clypeal margin is *haydenii* LeConte, but here also the clypeus is shorter than in *aequalis*,

and further differences include the medially toothed claws of *haydenii*, the transversely tumid front of the head, and the acute front angles of the pronotum. The pronotum of *aequalis* is very much like that of the large *punctulata* Horn from Baja California, but in the Mexican species the hind angles at the extremity turn down and under, whereas in *aequalis* they are flat or turn slightly upward.

The labrum is somewhat variable. Some individuals have the front edge rather arched as in the *brevicollis* type of labrum; some have it scarcely arched; some have it more deeply concave than others. On the whole it is more the *haydenii* type of labrum, that is, distinctly wider than it is long at the middle and not longer than the under side of the clypeus (figs. 100, 101). The usual furrow present on the under side of the clypeus is faint or lacking in some specimens of *aequalis*.

Fall, although he did not describe it, recognized this species as distinct because in his collection at the Museum of Comparative Zoölogy I found a specimen from the Sierra Ancha Mountains labeled as a new species.

***Diplotaxis atlantis* Fall**

Figures 222, 223

Diplotaxis atlantis FALL, 1909, p. 44, pl. 1, figs. 13, 16 (Rhode Island; type, male, in the Museum of Comparative Zoölogy). VAURIE, 1956, fig. 2 (front tibia).

Diplotaxis nigra CARTWRIGHT, 1939, p. 361 (Hinton, Oklahoma; type, male, in the United States National Museum).

DIAGNOSIS: The labrum is like that of *liberta*, not long and arched strongly in front as in *tristis*. Superficially, *atlantis* probably most resembles the western species, *boops*, but the pronotum is proportionately longer in *atlantis* and the head is not smooth and even as in *boops*. Differs from the other large glabrous eastern species by having the sides of the pronotum evenly and feebly arcuate, not at all sinuate, and the angles not impressed. It also has the clypeus usually nearly truncate instead of emarginate, and the mentum with its apical declivity oblique and pushed forward, not level with the base of the mentum.

RANGE: Northeastern United States from New Hampshire and (*in litt.*) Maine south to Maryland and (*in litt.*) Georgia, west to Ne-

braska, Kansas, and Oklahoma. Evidently not in extreme south of United States, but one specimen seen from "Gouadeloupe" [West Indies?]. About 250 specimens have been examined (see Appendix).

DESCRIPTION: Length, 10 to 12.5 mm. Color black or dark red. Agrees with description of *brevicollis*, except as follows: head and clypeus combined shorter than pronotum; clypeus with front margin truncate or only very slightly sinuate; labrum finely punctured, twice or three times wider than long, not longer than reflexed under side of clypeus, convex in front, concave behind, front margin not strongly arcuate; mentum oblique from base to rear edge of declivity in apical third, declivity flat, posteriorly truncate, ridged, and pubescent; pronotum long, not notably transverse, surface shining between uniform punctures which are distinctly impressed, and of same size as those of head, but sparser, sides evenly arcuate from base to apex, angles neither acute nor impressed; scutellum with several basal punctures, or impunctate; elytra about three times longer than pronotum, punctures sparser, punctures of costae small or minute, marginal hairs scarcely visible beyond epipleurae when viewed from above; pygidium in type and some other specimens with depressed line at middle; claws bent angularly, cleft subapically, tooth as long as and wider than claw. Male genitalia about as in *brevicollis* (figs. 222, 223), including basal piece.

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This species ranges farther west than all the other large or rather large eastern species (*liberta*, *tristis*, *sordida*, *vandykei*, *subcostata*) except *harperi* (smaller) and *blanchardi* (8.5 to 10 mm.), both of which differ notably from *atlantis* by having the base of the pronotum transversely depressed, among other characters.

There appears to be a break in the geographic distribution of *atlantis*, for specimens are recorded from the Atlantic coast and from Illinois and the central states, but not from the area between. Although reported in the literature from as far south as Georgia, I have not seen any coastal specimens from south of Maryland in the United States. Curiously enough, however, I have seen a female specimen of *atlantis* (12 mm.) in the Berlin Mu-

seum from "Gouadeloupe," presumably the Antillean island of that name. If this specimen is labeled correctly, then *atlantis* is the third species of the genus occurring in the West Indies, the others being *jamaicensis* (Jamaica) and *ebenina* (Martinique). I have never seen the last-named, which is known only from the type specimen (see *Incertae Sedis*), but *jamaicensis* is evidently common.

The western population of *atlantis* was described as *nigra* (Hinton, Oklahoma) and was synonymized by Vaurie (1956, p. 3). A faint medio-basal line on the pronotum is present in some specimens from Brooklyn, New York, as well as in the specimens from Oklahoma (the line is longer and deeper in the type of "*nigra*") and in the specimen from the Antilles, but this is a variable character in most members of this group. The majority of *atlantis* have an impunctate median space of varying proportions instead of an impressed line. Many specimens have two pits on the head, which may be shallow or deep. These pits, with the sharply ridged mentum and virtually truncate clypeus, separate this species from *belfragei* which is a western species that has occurred in central Oklahoma near *atlantis*.

Diplotaxis liberta Germar

Figures 222, 223

Melolontha liberta GERMAR, 1824, p. 123 ("America septentrionali," here restricted to the eastern United States; type probably in a European museum). FALL, 1909, pl. 1, figs. 13, 21 (clypeus, claw). VAURIE, 1956, fig. 1 (pronotal angle).

Melolontha moesta SAY [not Germar], 1825, p. 197 (United States; type destroyed).

Diplotaxys [sic] *georgiae* BLANCHARD, 1850, p. 171 ["Savannah (Georgie)"; type not found in Muséum National d'Histoire Naturelle, Paris].

DIAGNOSIS: This species differs from the other large glabrous eastern species of the group (*atlantis* and *tristis*) by having the pronotum not densely punctured but irregularly and sparsely, often with impunctate areas as large as the scutellum, the scutellum, however, densely punctured, not virtually impunctate, and the front angles of the pronotum exceedingly narrow, acuminate, and drawn forward.

RANGE: Ontario, Canada (according to Fall, 1909, p. 49) and the eastern coast of the United States from Massachusetts south to northern Florida, west to Mississippi and southern Louisiana, and north to Ohio; and, according to Hubbard and Schwarz (1878, p. 636), Marquette and Escanaba, Michigan. Fall (*loc. cit.*) said that Wickham reported it from Ames, Iowa. A specimen seen from El Mirador Ranch, Baboquivari Mountains, Arizona, September, 1950, has no doubt been mislabeled. A total of about 200 specimens has been examined (see Appendix).

HABITAT: According to Leonard (1928, p. 424) this species was taken in May in East Aurora, New York, about the roots of *Populus grandidentata*. C. A. Frost (1956, *in litt.*) tells me he has found it "under pine needles" in July, at Natick, Massachusetts, and "dug up at foot of western pine" in May at Sherborn, Massachusetts. A specimen in the collection of Cornell University was collected "on Scotch pine" in July, at Waverley, New York.

DESCRIPTION: Length, 10.5 to 13 mm. Color black, a few specimens dark red. Agrees with description of *brevicollis*, except as follows: head and pronotum combined shorter than pronotum; head coarsely and densely punctured, in some specimens also confluent punctured, but very finely at extreme vertex; post-clypeal convexity, if present, not well defined; clypeal suture indistinct, obliterated in many specimens; canthi prominent in some specimens; last segment of maxillary palpi apparently not impressed or flattened; labrum finely punctured, twice wider than long, not longer than reflexed under side of clypeus, convex in front and slightly concave behind, front margin scarcely arcuate; mentum flat, not sunk at middle, a flat declivity at apical third evident only because of its raised and pubescent hind margin; pronotum not notably transverse, surface shining between punctures, which are deeply impressed, twice as large as those on head, very sparse and irregularly spaced, especially on disc, denser on sides, sides widest behind middle, thence sinuate and, in most specimens, strongly constricted to acute, narrow, and long drawn out front angles, hind angles obtuse and shallowly or deeply impressed within, base at center slightly depressed and

with dense, confluent punctuation; scutellum with from five to 20 punctures; elytra three times longer than pronotum, punctures of same size as but denser than those of pronotum, punctures of costae small but not minute; marginal hairs not visible beyond epipleurae except barely so in two of 59 specimens; hind tarsi no longer than hind tibiae; claws bent angularly, cleft subapically, tooth slightly shorter and slightly thicker than claw. Male genitalia as in *brevicollis* (figs. 222, 223), but basal piece longer than lobes and lobes narrower at apex.

SEXUAL DIMORPHISM: As in *brevicollis*, except that the hind tarsi of females are shorter than hind tibiae.

REMARKS: The pronotum (see diagnosis) is characteristic and is sufficient, along with the dark color, to separate the species from all others. Reddish-colored specimens, which occur occasionally, may be confused with some large specimens of the eastern *subcostata* (*subcostata* group) that have the front angles of the pronotum acute. In general, however, these angles are not acute in *subcostata*, and *liberta* differs further from it by having the hind femora narrow, not wide and bulbous, the margins of the elytra hairy, the labrum advanced from, not level with, the under side of the clypeus, the pronotum more sparsely punctured, and the front tibiae with the third tooth nearer the apex of the tibiae, not submedian.

In 1856 (p. 273) LeConte did not know *georgiae* Blanchard, but in 1873 (p. 329) he evidently saw the type in the Paris Museum and found it "similar to *D. subcostata* Blanch. but larger, with the prothorax more sparsely and coarsely punctured." I was not able to see the type, but follow Fall (1909, p. 93) and Dalle Torre (1912, p. 147) in considering *georgiae* a synonym of *liberta*, not of *subcostata*.

The status of *moesta* Say was clarified by LeConte who said (1859b, p. 299) that it was "a species of *Diplotaxis*, previously described as *M. liberta* Germ."

As stated previously (Vaurie, 1958, pp. 382, 386) *liberta* is not unlike *sordida* (*sordida* group), but that species is covered with dorsal hairs, has virtually no costae, and has the pronotum densely punctured and the top of the head impunctate.

SECTION 4 OF THE SPECIES GROUP
brevicollis-haydenii

The small species of this section (*mentalis*) differs in a number of ways from the species of the preceding sections but is placed here because of the distinct furrow on the under side of the clypeus.

Diplotaxis mentalis Fall

Figure 227

Diplotaxis mentalis FALL, 1909, p. 33, pl. 1, fig. 12 ("Texas . . . New Mexico"; type is from Texas, a female, in the Museum of Comparative Zoölogy).

DIAGNOSIS: The distinct, sharp, punctate, transverse ledge across the clypeus, which makes a deep crease just in front of the clypeal suture, distinguishes this species from all others (but see also remarks below). In addition the labrum is exceedingly large and convex, extending out from the under side of the clypeus, and the mentum is neither declivous nor concave, but smoothly convex.

RANGE: Western United States from Colorado and Utah south into southern Chihuahua (one specimen only), and most of Texas. About 150 specimens have been examined from six states (see Appendix). A specimen mentioned by Fall from "Tennessee" requires confirmation; it was probably mislabeled.

HABITAT: According to data supplied by C. Clayton Hoff, this species was taken from juniper litter in New Mexico.

DESCRIPTION: Length, 8 to 9 mm. Color black or dark red. Agrees with description of *brevicollis*, except as follows: head in front with triangularly shaped impression that is much more sparsely punctured than remainder of head, the latter in some specimens densely punctured, evenly convex; clypeal suture sinuate; clypeus ridged, one-third of the length of head, front margin either strongly emarginate or nearly truncate, more broadly reflexed behind the rounded but obtuse lateral angles than at middle; labrum at least three times wider than long, advanced and convex along front margin (which is scarcely arcuate), and slightly concave near hind margin, same length at middle as at sides and same length as or slightly longer than reflexed under side of clypeus; mentum

slightly convex throughout, without declivity in front; pronotum with punctures coarser in some specimens, and in some of about same size and sparseness as those on head, sides widest slightly behind middle, thence strongly cut back to obtuse hind angles, less strongly arcuate to somewhat acute front angles, angles not impressed, base slightly depressed and margined; elytra about three times longer than pronotum, punctures sparse or dense, marginal hairs as long as scutellum; metasternum in some specimens not quite twice longer than second abdominal segment; hind femora of some females wider than length of second abdominal segment, hind tarsi shorter than hind tibiae in females; pygidium punctured densely or sparsely. Male genitalia as in figure 227 of *connata*, but shorter; basal piece shorter than lobes.

SEXUAL DIMORPHISM: As in *brevicollis*.

REMARKS: This species is readily recognized by its complete clypeal ridge. The only species that approach it in this respect are as follows: In the same geographical range there is *abnormis* Fall, which may have the clypeus rather tumid transversely, but this species differs by having only nine segments in the antennae, the pronotal hind angles explanate and depressed, and the head or pronotum with pruinose or eroded areas. Also from the same range are *fissilabris* and *knausii*, also *aulacochela* from Texas, three species that have a very slight clypeal ridge in some specimens, but these species differ notably from *mentalis* by having the labrum cleft at the middle. In *vandykei* from Alabama the sides, not the middle, of the clypeus have a shiny, impunctate carina, but this species is dorsally hairy, not glabrous. Finally there are some extreme individuals of *simplex* from southern Mexico that have the clypeus virtually ridged (though most specimens have it merely tumid), but *simplex* differs by having the labrum flat, the claws bent abruptly and toothed nearer the apex, and the mentum declivous and pubescent.

A single specimen from Santa Barbara, Chihuahua, near the northern border of Durango, does not differ from individuals from farther north.

This species may be allied to *conformis* (as stated by Fall, 1909, p. 34) which has similar mentum, pronotum, and long marginal hairs,

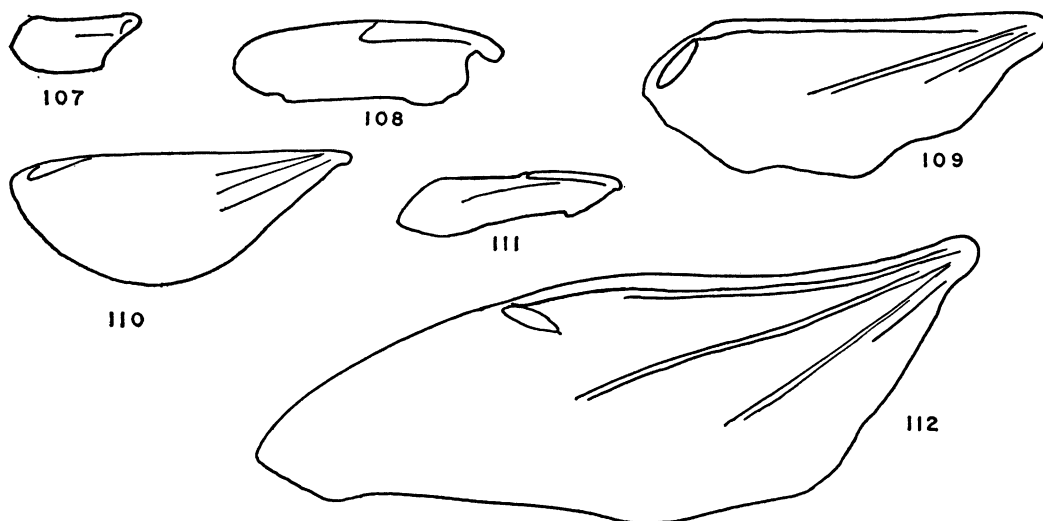
and occurs in about the same areas except that it is absent from Texas and Chihuahua, but *conformis* (*marginicollis* group) differs notably in its short, strongly indented, not convex labrum, longer and flat clypeus, and virtual absence of the furrow on the under side of the clypeus. Another species with the mentum convex and without apparent declivity is *tenebrosa* (*residua* group) which is more northern in distribution; has short, ovate elytra; stout and bulbous, not slender and straight, terminal segments on the maxillary palpi; and no clypeal ridge.

SPECIES GROUP *CONNATA*

The following species compose this group: *Diplotaxis rotunda*, new species; *connata* Schaeffer; *saylori* Cazier; and *macronycha* Fall.

These species, of which about 150 specimens have been examined, seem to be allied to the species in section 3 of the *frondicola* group in their large pronotum, small eyes, and more or less rounded clypeus. They are placed in a group by themselves, however, because of their nearly apterous condition. The inner wings are scarcely longer than the meta-episternum (about 2 or 3 mm.), even shorter (1

mm.) in *connata*; the wings are never folded under and lack most of the veins (figs. 107, 108). As a result of the virtual atrophy of the wings, these species are ovate in shape, have the usual callus of the humeral umbone obsolete (this area being flat), the subapical callosities of the elytra rounded off and obsolete, and the scutellum no longer than wide (fig. 65). The elytra are not truly connate but are rather difficult to pry apart at the suture. The metasternum, measured between the middle and hind coxae, is no longer than the second segment of the abdomen; the sides of the elytra are strongly arcuate, not parallel as is normal in fully winged species; and the pronotum is large in relation to the elytra, longer at the middle than at the sides in some species (*connata* and *rotunda*). The eyes are small, widely spaced, and nearly hidden in the prothorax; from below they are seen to be quite distant from the gular region (by two and one-half times the width of the antennal scape) and from the insertion of the antennae (fig. 8). Tiny hairs are present in the punctures of the elytra. There are other species with reduced wings, at least in some individuals (*brachyptera*, *brevisetosa*, *obscura*, *fimbriata*, *muricata*, *residua*, and *rudis*), but none of



FIGS. 107, 108. Reduced left wings of *connata* group of *Diplotaxis*. 107. *D. connata*, wing of 1 mm. 108. Wing of 2 mm. of *D. rotunda*; characteristic also of *D. macronycha* and *D. saylori*.

FIGS. 109-112. Reduced left wings of *D. fimbriata* from California (*frondicola* group). The scale is smaller than in figures 107 and 108. 109. Wing of 6 mm., Yermo. 110. Wing of 5 mm. Borego. 111. Wing of 3 mm., Palm Springs. 112. Wing (almost full) of 10 mm., Painted Canyon, Riverside County.

these species has such short wings or such flat humeri as in the present group (their wings reach at least as far as the third or fourth abdominal segment and are folded in some of the species). It is unfortunate that no data are available on the habits of these flightless species, except for the fact that some *connata* are taken on weeds.

The types of all the forms have been examined. The species are compared in the formal descriptions with *rotunda*.

A female specimen in the British Museum from Parada, Mexico (Sallé collection), probably represents another species in this group. It is listed in the "Biologia Centrali-Americana" (Bates, 1887-1888, p. 164) as, "22. *Diploptaxis*—?" The specimen was labeled by Bates as "*metallescens*, var.?", but it is not at all like that species.¹ I am not giving it a name at the present time, because I do not know from what part of Mexico it came (there are two places called Parada in San Luis Potosi, and one in Queretaro) and because there is but one specimen. In this group with rudimentary wings there is so much variability that a series is almost mandatory to warrant the naming of a new species. The salient characters are given, however, in case more specimens should be found.

The length is 8.5 mm.; the claws, reflexed elytral margins, and antennae are like those of *rotunda* and *connata*; the head, clypeus, canthi, and pronotal crease are like those of *saylori*; the labrum is concave as in *macronycha*. This specimen has a tiny wing, short metasternum, short marginal hairs, and minute dorsal hairs as in the group, but differs from the other species of the group by having stouter hind femora and tibiae, a slight humeral callosity, the abdomen tumid at the middle, and the pronotum shaped differently. The latter is short and transverse and has a distinct transverse basal impression not present in the other species. The sides of the pronotum are strongly bulbous behind the middle and constricted at the base.

CHARACTERS OF THE *connata* GROUP

The size ranges from 8 to 12 mm., the color is usually black. The following characters

¹ Discussed in part 1 (Vaurie, 1958) in *simplex* group.

common to all the species are not necessarily repeated in the descriptions.

Eyes seemingly flattened on sides of head, small (see fig. 8), in many specimens only the front edge of the eyes is visible. Antennal club small, no longer than last segment of maxillary palpi. Maxillary palpi with last segment impressed dorsally, in some individuals merely flattened. Mandibles in repose as long as labrum. Pronotum twice, or almost twice, as wide as long. Scutellum short (fig. 65), and in most specimens wider than long and virtually impunctate, but somewhat variable. Elytra convex, wings rudimentary, the sides arcuate, length from two and one-quarter to two and three-quarters times the length of pronotum, or nearly one and one-half times their width across base; second interval either unpunctate or with punctures in irregular double rows; marginal hairs scarcely visible, dorsal hairs actually present in all elytral punctures, but so minute as to be scarcely visible. Abdomen not ridged laterally, fifth segment grooved above pygidium but groove very shallow in some specimens, and groove and posterior spiracles often covered by elytra. Metasternum short, length between coxae equal to or shorter than length of second abdominal segment. Hind coxal plate variable in shape at sides at junction with elytral margin. It may be rounded or truncate, but in most specimens the front edge projects slightly onto the elytral margin. Middle tarsi with first segment distinctly longer than second; hind tarsi with first two segments subequal in length.

SEXUAL DIMORPHISM: See under the species.

DISTRIBUTION OF THE SPECIES

Three of the species occur in southern Arizona, and the fourth (*macronycha*) occurs in northern Arizona and New Mexico. (See fig. 113.) A fifth species (discussed above) is from Mexico.

KEY TO THE SPECIES OF THE *connata* GROUP

1. Hind femora bulbous at middle (fig. 93); claws toothed near middle and longer than half of the claw segment; northern Arizona; New Mexico *macronycha*

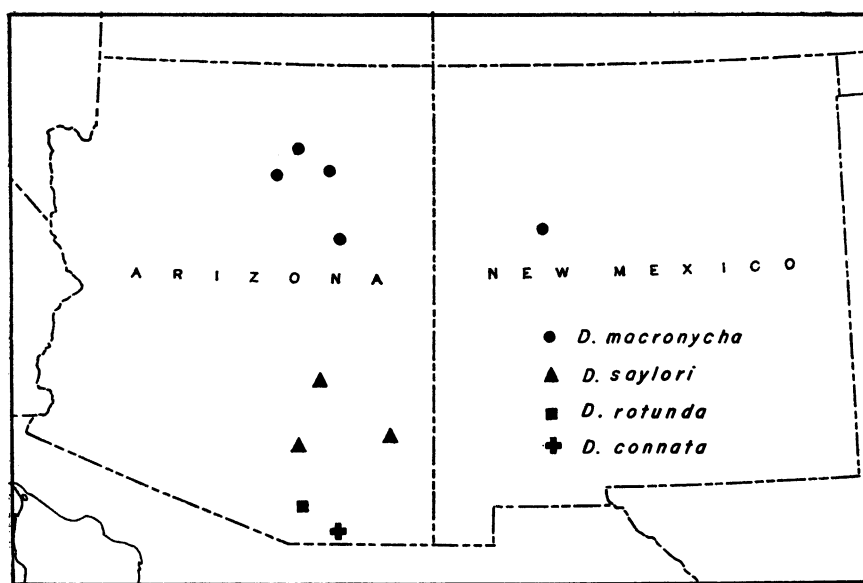


FIG. 113. Distribution of the four species of the *connata* group of *Diplotaxis*.

- Hind femora with sides virtually parallel (except near apex); claws toothed subapically and shorter than half of the claw segment; southern Arizona 2
2. Antennae nine-segmented; hind angles of pronotum impressed within and explanate; Graham, Pinal, and Santa Catalina Mountains *saylori*
- Antennae 10-segmented; hind angles of pronotum not impressed or turned upward or outward; Huachuca and Santa Rita Mountains 3
3. Elytra densely punctured and/or with numerous elongate punctures; lobes of male genitalia elongate, curved (in profile), inner edges scarcely separated (figs. 227, 228) *connata*
- Elytra sparsely punctured, with all punctures round; lobes of male genitalia shorter, straight (in profile), inner edges widely separated (fig. 175) *rotunda*

***Diplotaxis rotunda* Vaurie, new species**

Figures 108, 113, 175

TYPE MATERIAL: Type, male, Madera Canyon, Santa Rita Mountains, Pima County, Arizona, June 7, 1952, M. Cazier, W. Gertsch, R. Schrammel, collectors, in the American Museum of Natural History. Thirty-five male paratopotypes in the same

museum and in the following collections: United States National Museum; University of California at Berkeley; California Academy of Sciences; University of Michigan; Illinois Natural History Survey, Urbana; British Museum (Natural History); Zoologisches Museum, Berlin; and Instituto de Biología, Mexico City.

DIAGNOSIS: Differs from *connata* in the male genitalia, larger size, longer wings (fig. 108), much sparser elytral punctuation arranged in neat regular rows, and in the absence of elongated punctures on the elytra, but is otherwise very similar.

RANGE: Known only from the type locality in the Santa Rita Mountains of southern Arizona southeast of Tucson (fig. 113). Fifty-nine additional specimens have been seen in addition to the paratypes: Madera Canyon, July 28, 1949 (W. J. and J. W. Gertsch), six; upper Madera Canyon, August 24, 1950, 6000 to 6500 feet (T. Cohn, P. Boone, M. Cazier), two males; Madera Canyon, July 14, 1952, July 24, 1953 (G. M. Bradt), one male, two females; same data as type, 48.

DESCRIPTION OF TYPE, MALE: (See also characters of group). Wings about 2 mm., scarcely longer than meta-episternum. Length, 11 mm. Color black. Head uniformly

convex, on same level as clypeus and continuous with it when viewed in profile, no interruption at suture, finely, densely punctured. Clypeal suture obliterated at middle. Clypeus one-half of the length of head, punctured as on head, front margin shallowly emarginate and scarcely reflexed between broadly rounded angles, sides not sinuate. Eyes small, each eye one-seventh of width of head. Antennae 10-segmented. Labrum finely, densely punctured, longer than and level with reflexed under side of clypeus, flat in front, concave behind, sides prominent. Mentum with anterior declivity in apical third posteriorly arcuate, margined, and pubescent.

Pronotum longer at middle than at sides, punctures of disc slightly smaller than those on head and sparse (separated by twice or more than twice their diameters), dense on sides, sides widest near middle and uniformly gently curved, front angles rather drawn forward, acute but rounded off, hind angles obtuse but sharp. Elytra with punctures slightly larger and even sparser than those on pronotal disc, especially sparse on first interval where some punctures are separated by three or four times their diameters; costae and suture flat, with tiny punctures in single row; humeral and subapical callosities obsolete; reflexed sides of elytra as wide opposite fourth abdominal segment as opposite first one. Pygidium deeply, densely, coarsely punctured. Propygidium with spiracles and groove indistinct.

Front tibiae with third tooth in front of middle and more distant from the two apical teeth than they are from each other. Hind femora rather straight, no wider than length of second abdominal segment, their lower edge scarcely emarginate at apex. Claws about one-half of the length of claw segment, bent abruptly at apex, cleft near apex. Genitalia as in figure 175 of *sulcatula*; basal piece longer than lobes.

SEXUAL DIMORPHISM: The sexes are rather difficult to separate, but the best character is the shape of the pygidium which is transverse in the male and rather pointed and elongate and equal-sided in the female. The fifth abdominal segment is very slightly longer in females, the first segment of the hind tarsi a little shorter and wider than in males, and the hind tarsi are shorter.

VARIATIONS FROM TYPE: The length in the series examined ranges from 9 to 11.5 mm. In a dozen specimens the regularity of the elytral rows is interrupted where two of the discal costae become fused, either near the base or the middle of the elytra, and on one side only or on both sides. Some individuals have a longitudinal impunctate space on the pronotum.

REMARKS: This species is so similar in some respects to *connata* that it was at first considered by me to be that species. It is, however, found together with *connata* in the Santa Rita Mountains in the southeastern part of Pima County. The differences given in the diagnoses and the key are constant in the two species. In addition to the characters mentioned, the elytra are not so convex or so short in *rotunda* as in *connata*, and the sides of the pronotum, which are rather strongly arcuate in some specimens of *rotunda*, are never so constricted to the base as in *connata*. The male genitalia (figs. 175, 227) are shorter and stouter than those of *connata*, even though the latter is a smaller species; the lobes in *rotunda* are straight when viewed in profile, not curved, and are joined on the inner side a little farther from the base than in *connata*.

***Diplotaxis connata* Schaeffer**

Figures 65, 107, 113, 227, 228

Diplotaxis connata SCHAEFFER, 1905, p. 158 (Palmerlee, Cochise County, Arizona [near Huachuca Mountains]; lectotype, male, here designated from original series in the United States National Museum).

DIAGNOSIS: Very similar to *rotunda* in the shape of the pronotum and clypeus, but generally smaller in size; it has a rounder elytra and shorter wings, is very densely, not sparsely punctured, and has many elongate instead of round punctures on the elytra, especially on the striae. The elongate punctures distinguish this species also from *macronycha* and *saylori*.

RANGE: The Huachuca and Santa Rita Mountains of southern Arizona (fig. 113¹). A total of 33 specimens has been examined: Palmerlee, seven (type series); Huachuca

¹ In figure 113, the symbol for *connata* should appear also beside that of *rotunda*.

Mountains, 18; Garden Canyon, Huachuca Mountains, July, one; 1 mile west of Montezuma Pass, Huachuca Mountains, 6000 feet, June, September, four; Miller Canyon, Huachuca Mountains, July, one female; Madera Canyon, Santa Rita Mountains, July 30, 1955, two.

HABITAT: According to Schaeffer (1905, p. 158), "a common species on low weeds."

DESCRIPTION: (See also characters of group). Wings vestigial, about 1 mm. long, shorter than one-half of the length of meta-episternum. Length, 7.5 to 9 mm. Color black. Head, clypeal suture, and clypeus as in *rotunda*, except that clypeus in some specimens is longer than one-half of the length of head, and front margin in some specimens, including the lectotype, is truncate. Eyes, antennae, labrum, and mentum as in *rotunda*, except that labrum is less concave.

Pronotum with punctures of disc of about same size and density as those on head, center with an impunctate space in some specimens (not in lectotype), sides widest at middle, strongly constricted or cut back to base, front angles slightly acute and drawn forward, hind angles obtuse and depressed. Elytra with punctures of about same size as those of pronotum, in some specimens as dense as on pronotum, at least on sides of elytra, in some rather sparse on first interval, majority of punctures of intervals and striae elongate; costae flat, with an irregular row of smaller, round punctures, or costae scarcely differentiated from other intervals because of maze of punctures; suture with irregular or double row of punctures; humeral and subapical callosities and reflexed sides of elytra as in *rotunda*. Pygidium and propygidium as in *rotunda*.

Front tibiae, hind femora, and claws as in *rotunda*. Male genitalia as in figures 227 and 228; basal piece longer than lobes.

SEXUAL DIMORPHISM: As in *rotunda*.

REMARKS: This is the most southern of the four flightless species of the group and the one first described. It has the inner wings so small that they are readily overlooked (fig. 107), being no longer than the scutellum is wide. Schaeffer (1905, p. 158) mentions the "ovate and apparently connate elytra and the absence of wings," and Fall (1909, p. 54) considered both *connata* and *macronycha* "com-

pletely apterous." Evidently neither author dissected the wings. Darlington (1936, p. 137), in his study of flightless carabids, says "I have never seen a Carabid in which the inner wings were entirely lacking," which may be true also for other groups of beetles, such as the group under discussion.

In a few specimens the punctures of the first interval of the elytra are nearly as sparse as they are in *rotunda*, but they are elongate, not round. Other intervals and the costae, however, are rather densely punctured in all specimens, and in some the entire elytra are filled with a maze of punctures. Many individuals have the elytra almost as wide at the widest point as long.

***Diplotaxis saylori* Cazier**

Figures 108, 113, 175

Diplotaxis saylori CAZIER, 1940c, p. 128 (Oak Flat, Mt. Graham, Arizona; type, sex?, in the United States National Museum).

DIAGNOSIS: Differs from the other species by having nine instead of 10 segments in the antennae and the hind angles of the pronotum impressed within and flared upward. It also has the head flatter, the clypeus somewhat longer, the punctures of the elytra very shallow and indistinct, and the dorsal surface quite opaque.

RANGE: Mountains of southern Arizona (fig. 113). Ten specimens, including the type, have been examined. They are: Graham Mountains, two females, including a paratype; Pinecrest, Graham Mountains, September, one male, one female; Wet Canyon, Graham Mountains, July, September, one male, two females; Pinal Mountains, June, one male; Mt. Lemmon, Pima County, one male.

DESCRIPTION: (See also characters of group). Wings about 2 mm. long, same length as meta-episternum or as meta-episternum and hind coxae combined. Length, 8 to 12 mm. Color black or dark red. Head on same plane as clypeus, but clypeal suture present and impressed in most specimens, front flattened, surface uneven in some specimens, vertex with impunctate area of varying size, punctures dense, some of them confluent. Clypeus almost as long as head and with same kind of punctuation, front margin either truncate or gently emarginate, and reflexed be-

tween broadly rounded angles, sides not sinuate but slightly bent inward from rather prominent canthi. Eyes as in *rotunda*. Antennae nine-segmented. Labrum and mentum as in *rotunda*, except that labrum is somewhat more extensively concave.

Pronotum with punctures of disc of same size as those of head but sparser, center with a narrow crease or (in one specimen) an impunctate space, sides widest at middle, then converging slightly to front angles that are rather acute and drawn forward, but rounded (or worn?) in four specimens, and to rounded-obtuse hind angles that are broadly impressed within, side margins somewhat reflexed. Elytra with punctures of same size as those of pronotum but more shallowly impressed; costae flat, with very tiny shallow punctures in either straight or irregular row; suture and callosities as in *rotunda*, except that in some specimens the humeral umbone is present although reduced; reflexed sides of elytra ill-defined. Pygidium and propygidium as in *rotunda*, except that groove is distinct in some specimens.

Front tibiae, hind femora, and claws as in *rotunda*. Male genitalia as in figure 175 of *sulcatula*; basal piece longer than lobes.

SEXUAL DIMORPHISM: About as in *rotunda*, but the sex of some individuals cannot be determined without dissection.

REMARKS: This rare species resembles *rotunda* (Santa Rita Mountains) more than the other species of the group, having similar long, narrow, straight hind legs and similar wings (fig. 108), robust body, and general size and shape. The male genitalia are also very similar but have the apices somewhat flatter. Both species appear to be restricted to high mountains. The Graham Mountains reach 10,516 feet; Mt. Lemmon is 9150 feet in elevation; the Santa Rita Mountains are perhaps not quite so high.

The majority of individuals examined have a longitudinal crease at the center of the pronotum that is not present in the other species. One specimen (a male from the Pinal Mountains) lacks the crease, and differs further not only by being smaller (8 mm.), but by having the clypeus shorter, the clypeal suture obliterated, the tarsi shorter, and the front of the head rather convex, not so flat. A male from Mt. Lemmon differs also from the specimens

from the Graham Mountains by being smaller, by having a shorter clypeus, and by having more acute front angles on the pronotum; it differs somewhat from the other small male in the shallower punctuation and the more sinuate sides of the pronotum. The genitalia of both specimens seem to agree with those of a male from Graham Mountains. Additional specimens from these and other localities are needed for us to be certain that these are variants of *saylori* and not distinct species. Other individuals present slight differences also, some having the front margin of the clypeus virtually truncate, some having it quite strongly emarginate. This species may be in "a state of genetic instability," as was found by Given (1952, p. 11) of a group of melolonthid beetles of New Zealand. He says: "In some of the alpine species of *Odontria* the author has never yet found two or more specimens apparently morphologically identical, and this lack of uniformity is present not only externally, but also in the internal male genital equipment."

The sex of the type was not determined because the specimen was not dissected. It appeared to be a female on one character (long fifth abdominal segment), but a male on another (long first hind tarsal segment): The pygidium is more or less rounded at the apex. The wing was not dissected on the type.

Diplotaxis macronycha Fall

Figures 93, 108, 113, 213, 214

Diplotaxis macronycha FALL, 1909, p. 55, pl. 1, fig. 24 (Moqui [Moquino], New Mexico; type, male, in the Museum of Comparative Zoölogy).

DIAGNOSIS: This species differs from the other species by having the hind femora thicker, also bulbous at middle, the claws longer and toothed nearer middle instead of near apex, the clypeus more reflexed in front, the pronotum more abruptly narrowed and cut back to the base, the posterior spiracles prominent, and much broader lobes on the male genitalia. It is also narrower and more elongate.

RANGE: Northern New Mexico and northern Arizona (fig. 113). Sixteen specimens have been examined, including the type from Moqui, New Mexico (probably Moquino, see below). The Arizona specimens are from Hol-

brook, one male, one female; Cameron, two males, one female; Tuba City, five females; and Oraibi, five females. The specimens were collected in June and July.

DESCRIPTION: (See also characters of group). Wings about 2 mm., same length as meta-episternum and hind coxae combined. Length, 8 to 10 mm. Color black (one specimen tawny). Head convex to clypeus where interrupted by impressed suture, densely punctured. Clypeus longer than one-half of the length of head, punctures as on head or slightly smaller, front margin truncate or with slight emargination at middle, angles broadly rounded; front third of clypeus broadly reflexed; sides not sinuate or bent inward. Eyes one-fifth or one-sixth of the width of head. Antennae and labrum as in *rotunda*. Mentum as in *rotunda* but anterior declivity less prominent.

Pronotum with punctures of disc of same size as those of head and almost as dense, center in some specimens with an impunctate space, sides widest at middle, sinuate to acute front angles and strongly cut back to obtuse sharp hind angles which, with the basal margins, are in some specimens slightly turned inward under the thorax. Elytra with larger and sparser punctures than those on pronotum; second interval as well as flat costae not clearly differentiated as separate units, costae with punctures in irregular row and scarcely smaller than punctures of other intervals; suture rugose, punctures apparently in one row; elytral callosities as in *rotunda*, reflexed sides of elytra ill-defined. Pygidium as in *rotunda*, but in some specimens very convex and rugose, the punctures elevated like small craters. Propygidium with prominent spiracles and deep, punctate, transverse groove.

Front tibiae with teeth equidistant, the third or basal tooth placed about at middle. Hind femora bulbous, wider than length of second abdominal segment, the lower edge distinctly emarginate apically. Hind tibiae with fringe of hairs on inner side. Claws longer than one-half of claw segment, gently curved, tooth near middle and much shorter than claw. Male genitalia as in figures 213 and 214; basal piece longer than lobes.

SEXUAL DIMORPHISM: After dissecting most of the specimens, I find that the most reliable distinguishing character between the

sexes is the narrower long hind tibial spur of the male (in female the spur is nearly as wide as base of first tarsal segment) and the longer first hind tarsal segment in the male (as long as spur in male, shorter than spur in female). The inner edge of the hind tibiae is more abundantly hairy in males than in females.

REMARKS: The hind femora (fig. 93) are more bulbous in this species than in any other species I know except *femoralis*, a tiny pale species from the west coast of Mexico. Although these femora appear more bulbous in some females, the most bulbous femora of all the specimens occurs in a male from Cameron, so that it is probably an individually, not sexually, variable character. The male genitalia (figs. 213, 214) are also unusual, because they have the basal piece (viewed dorsally) narrower instead of wider at the apex than at the base. The lobes are proportionately much larger and wider than in the larger species (*rotunda* and *saylori*).

The specimens are quite uniform, although some of them have the pronotum more strongly constricted than do others; in some also the pygidium is extremely rugose, with the punctures elevated; in three specimens the abdomen is tumid at center. The vestigial wings are much longer than in *connata*, but about as in the other species of the group (fig. 108). The front tarsi seem to have the first two segments more or less expanded on the inner side.

A species with similar head and spatula-shaped clypeus is *residua* Fall from Idaho which differs from *macronycha* principally by having a longer but not full wing, the humeral umbone not entirely obsolete, the elytra not so ovate, the first segment of the hind tarsi shorter than the second, and the marginal hairs of the elytra as long as the scutellum. Fall (1909, p. 55) mentions the "doubtless rudimentary or wanting" wings for *macronycha*, but not for *residua*.

Both *macronycha* and *saylori* appear to be quite rare in collections. Thirteen of the 16 specimens of *macronycha* examined were collected by R. P. Allen in 1937.

Being unable to locate the type locality on modern maps or in a postal guide, I communicated with Dr. C. Clayton Hoff of the University of New Mexico who tells me (*in litt.*) that "Moqui is probably the same as Moquino, a

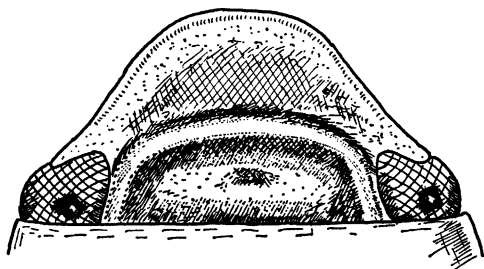


FIG. 114. *Diplotaxis corbula*, type, showing tumid front of head and spatulate clypeus.

small settlement in Valencia County, located a few miles north of Laguna and at the northern edge of the Laguna Indian Reservation . . . about half way between Paguate and Cebolleta." This places the type locality west of Albuquerque.

NEW SPECIES NOT ASSIGNED TO GROUP

The following six new species are not placed, for the present, in any group. Three of them seem to be related to species of groups already treated in part 1 (Vaurie, 1958), one resembles superficially the *brevicollis* group of species, and the two others are alike.

Diplotaxis corbula Vaurie, new species

Figures 54, 114, 175

TYPE MATERIAL: Type, male, Holtville, California, June 28, 1936, M. Cazier, collector, in the American Museum of Natural History; one male and three female paratypes from Laguna Prieta [not located], Sonora, Mexico, May 25, 1938 [no collector given], in the above museum and in the California Academy of Sciences.

DIAGNOSIS: This sparsely hairy species seems to be most similar to the species of the *breviens* group, but differs from them as well as from others of the genus by having a combination of unusual hind tibiae that are more than twice wider at the apex than at the base, with the corbels widely exposed in both sexes (fig. 54); the sides of the hind coxal plate not margined; the clypeus as in figure 114; the front of the head strongly transversely tumid; the pronotum at the base narrower than the elytra; and the pronotal sides bulging at the middle.

RANGE: Southeastern California south into, probably, northwestern Sonora. A mountain range and a village are called Sierra Prieta in the northwestern desert of Sonora, but no such locality as Laguna Prieta has been found. According to Hugh B. Leech (personal communication), there is also another village with this name in the southeastern part of Sonora. Because of this uncertainty, the type was not chosen from the Sonora series.

DESCRIPTION OF TYPE, MALE: Length, 10 mm. Color tawny. Head with strong, transverse, sparsely punctured, uninterrupted post-clypeal convexity extending from eye to eye, head behind convexity nearly horizontal, punctured densely in front, sparsely on vertex; front of convexity abruptly declivous to clypeal suture, which is obliterated. Clypeus without hairs (hairs evident in two paratypes), at middle as long as head, suture visible at sides only, punctured densely but shallowly, front margin spatula-shaped, evenly rounded from side to side, but sides emarginate in front of eye (fig. 114). Eyes not sunk, each eye about one-fourth of width of head. Antennae 10-segmented, club about as long as funicle. Mandibles small, narrow. Last segment of maxillary palpi impressed basally. Labrum coarsely, densely punctured, appearing as if covered with tiny tubercles, slightly concave, level with and barely longer than reflexed under side of clypeus; front margin scarcely arcuate. Mentum rather flat but with declivity in anterior third slightly concave from side to side, its rear edge margined and pubescent.

Pronotum flat, virtually glabrous, but a few minute hairs on sides, only slightly wider than long, punctures of disc larger and sparser than those on head, center at base with short impunctate area, sides widest at middle where middle third is bulging and prominent, thence sides sinuate to obtuse front and hind angles, the latter sharp, angles not impressed; base narrower than shoulders of elytra. Scutellum punctured at sides of base. Elytra with distinct but short hairs in scattered punctures on sides, about two and one-half times longer than pronotum, punctures larger and sparser than those of pronotum; second interval irregularly unipunctate; costae rather flat, with irregularly placed small punctures; marginal

hairs somewhat worn but at least as long as a sutural interval; epipleurae not widened apically. Metasternum nearly twice as long as second abdominal segment. Hind coxal plate at sides rounded off, not margined. Propygidium with irregular shallow groove; spiracles fairly prominent. Pygidium very large, with deep, rugose punctures. Abdomen not ridged laterally.

Front tibiae with teeth equidistant, the basal (third) tooth about at middle of tibiae. All femora with very long hairs on upper edge (longer than width of femora), hind femora punctured irregularly, wider at middle than second abdominal segment is long. Middle and hind tarsi with first segment slightly longer than second, hind tarsi longer than hind tibiae. Claws somewhat bent, toothed near apex, tooth close to and shorter than claw. Genitalia as in figure 175 of *sulcatula* but apices hairy within; basal piece slightly longer than lobes.

SEXUAL DIMORPHISM: The type and the other male have an apical fringe of hairs on the inner edge of the hind tibiae which is lacking in two of the females, but present to a lesser degree in one female. Males also have slightly narrower hind femora than do females, not so bulbous or sinuous. The longer of the spurs on the hind tibiae is longer than the basal tarsal segment in both sexes, and the fifth abdominal segment is about as long as the fourth in both sexes. It was necessary to dissect all the specimens to be certain of the sex. Females have shorter hind tarsi.

VARIATIONS FROM TYPE: The specimens range in length from 10 to 10.5 mm. Dorsal hairs are noticeable on a male and female from Sonora on the back of the post-clypeal convexity and on the clypeus, and on another female on the elytra. Two of the paratypes have a vague double impression behind the convexity. The costae are rather convex in one of the paratypes. One paratype has paired abdominal swellings on the second segment.

REMARKS: The head and clypeus of this species have a distinctly phyllophagan appearance, but the unexposed sixth ventral segment, the absence of the suture on the propygidium, and the simple male genitalia show that the species does not belong in *Phyllophaga*. It has some features also of *Liogenys* (South America and part of Central Amer-

ica), which is not known from north of southern Mexico, but the males lack the enlarged and hairy front and middle tarsi of that genus.

Each of the distinctive characteristics of *corbula* is present in one way or another in other species of the genus. Thus the apically widened hind tibiae with their oblique, subapical, setose carinae and curved spurs and the large, bulbous hind femora are much like those of *errans* (Texas), and the hind femora also are like those of *subcostata* (eastern United States) and some others. The strongly pinched and tumid front of the head is like that in *subangulata*; the absence of a margined edge to the sides of the hind coxal plate is like that in the tiny *misella*; the rounded clypeus like that in the *frondicola* group. A number of other species that appear glabrous (*alutacea*, *fissilabris*, *guatemalica*, *jamaicensis*, and *knausii*) have, as does *corbula*, dorsal hairs that can be seen in some individuals. The hairs between the tips of the lobes of the genitalia of the male are present also in *hirsuta*, *brevicens*, *aulacochela*, *fissilabris*, and *barbarae* (fig. 219).

Many of the characters of *corbula* agree with the characters of the species of the *brevicens* group, the exposed corbels and curved hind tibial spurs being as in males of *fossipalpa*, the long femoral hairs, large pygidium, labrum, mentum, and bulging sides of the pronotum as in *fossipalpa* and/or the other species, as well as the deeply impressed last segment of the maxillary palpi. *Diplotaxis corbula* differs from the species of the *brevicens* group by having bent and apically toothed claws, the dorsal surface actually, though minutely, hairy, the head transversely tumid, and the clypeus not at all emarginate in front.

Diplotaxis mistura Vaurie, new species

Figure 224

TYPE MATERIAL: Type, male, San Salvador, El Salvador, May 1, 1957, P. A. Berry, collector, and nine female paratypes, San Salvador, "collected at light" on various dates in May, 1958, by O. L. Cartwright; also two male paratypes, Metapan [Santa Ana], El Salvador, May 7, 1958, O. L. Cartwright, collector. Type and seven paratypes in the

United States National Museum; four paratypes in the American Museum of Natural History.

DIAGNOSIS: This small southern species resembles a number of others in different groups (see remarks below). It has features of the *simplex* group and of *curvaceps*, *ohausi*, *juquilensis*, and *veracruzana*. Typical specimens have the front and sides of the clypeus emarginate, the front of the head rather flattened between the eyes, the elytra so crowded with punctures that the costae are virtually obliterated, the labrum longer than the under side of the clypeus, and the mentum strongly ridged in the apical half.

RANGE: From El Salvador and Honduras northward into southern Mexico in the states of Chiapas, Oaxaca (on the Isthmus), and Veracruz. In addition to the paratypes, 27 specimens have been examined (see Appendix).

DESCRIPTION OF TYPE, MALE: Length, 7.5 mm. Color dark red. Head sloping obliquely to clypeal suture, which is obliterated at middle, fairly densely punctured except for short, transverse, impunctate tumidity behind clypeus. Clypeus not hairy, more than one-half of the length of head, punctured more densely than head, front margin emarginate between rounded angles, broadly reflexed, sides cut in abruptly in front of eye. Eyes not sunk, each eye one-fourth of the width of head. Antennae 10-segmented. Maxillary palpi with last segment not depressed basally. Mandibles small. Labrum finely and densely punctured, flat, level with, and slightly longer than, reflexed under side of clypeus, front margin scarcely arcuate. Mentum declivous in apical half, declivity with hind margin pubescent, arcuate, and strongly margined.

Pronotum rather convex, punctures of disc about same size as but much sparser than those on head, sides subangulate, widest distinctly behind middle whence strongly arcuate to obtuse front and hind angles, angles not impressed. Scutellum densely punctured, except at apex which is impunctate. Elytra almost three times longer than pronotum, punctures larger than those on pronotum and dense; second interval multipunctate; costae indistinct because of their dense punctures which are almost as large as punctures on

each side; marginal hairs scarcely, if at all, longer than a sutural interval is wide; epipleurae not widened apically. Metasternum between coxae about one and one-half times longer than second abdominal segment. Propygidium not grooved, but densely punctured; spiracles not prominent. Pygidium convex, with irregular, crater-like punctures. Abdomen not ridged laterally.

Front tibiae tridentate, teeth in front of middle. Hind femora punctured, narrower than second abdominal segment is long, sides parallel. Middle and hind tarsi with first segment slightly longer than second, hind tarsi not longer than hind tibiae. Claws bent at right angles, cleft subapically, tooth nearly as long as claw. Male genitalia as in figure 224 of *turgidula*, but much smaller, its profile less curved and basal piece distinctly shorter than lobes.

SEXUAL DIMORPHISM: The type and other males have the hind femora, hind tibiae, and hind tibial spurs narrower than do females, the hind tibiae less flared out apically, the longer of the spurs the same length as the first segment of the hind tarsi (in females it is longer), the pygidium of the males more transverse, not so elongate. The length of the fifth abdominal segment appears to be the same in both sexes.

VARIATIONS FROM TYPE: Of the paratypes and other specimens, the size ranges from 6.5 to 9 mm., the color from blackish or dark red to reddish with black head and/or abdomen. The front of the head may have a slight depression with or without an inconspicuous transverse tumidity. A specimen from Lombardia, Honduras, has a strong tumidity. The clypeus may be as long as the head, with some punctures confluent, or have the front margin scarcely reflexed. Specimens from Almoloya, Oaxaca, Mexico, have the clypeal margin scarcely or not at all emarginate and the sides only slightly bent inward. The labrum in some specimens seems almost twice as long, and in some merely the same length, as the under side of the clypeus. The pronotum may be larger and have denser, larger punctures, as in individuals from Oaxaca and Veracruz; the punctuation of the scutellum varies. The elytra may be shorter, the punctures of their costae less dense, the second interval more or

less irregularly unipunctate instead of multipunctate. The pygidium may be flat and have dense or sparse punctures.

REMARKS: This species differs from the *simplex* group chiefly by having a shorter labrum, although *simplex* itself (and some specimens of *rita*) does not invariably have the labrum any longer than that of *mistura*. The latter in size and shape is quite like *simplex*, but differs in the male genitalia (not of the pincer type of *simplex*), in the sides of the pronotum (more subangulate), and in the clypeus (the clypeal suture is not sinuate at middle, and the clypeus is not tumid, but both these characters vary somewhat in *simplex*). These two species occur in three of the same states of Mexico (Chiapas, Oaxaca, and Veracruz). One of the two specimens of *mistura* examined from Playa Vicente, Veracruz (a dissected male), is labeled, in what seems to be Bates's handwriting, "*Diplotaxis sinuaticeps* Bates," a name now placed in the synonymy of *simplex* (Vaurie, 1958, pp. 366-368). The other specimen of *mistura*, in the British Museum, from this locality, labeled "No. 19," was recorded by Bates (1887-1888, p. 163) in the "Biologia" as "19. *Diplotaxis*—?. One specimen of a species also apparently distinct."

The type series and a few of the other specimens resemble small specimens of *ohausi* Moser, a species taken with *mistura* both on the Pacific slope in Chiapas by L. Hotzen in 1919, and in El Salvador by O. L. Cartwright in May of 1958. The male genitalia of these species are very different, however, and *ohausi* differs further by having hairs (though sparse) on the clypeus, the pronotum more finely punctured and with the sides evenly rounded, not subangulate, the elytra not densely punctured, and the antennal club longer.

The male of *mistura* has the same type of narrow hind femora as that of *veracruzana* but has shorter middle and hind tarsi, longer marginal hairs (hairs not visible in *veracruzana*), less emarginate clypeal margin with rounded, not sharp, lateral angles, and smoothly, finely, not roughly and unevenly punctured head and pygidium.

A female of *mistura* from Las Cruces, Oaxaca, was collected at the same time and place

as the type and paratypes of *crucis* (*trapezifera* group), which has much the same head and clypeus and densely punctured elytra, but *mistura* differs by having no hairs on the clypeus, the marginal hairs shorter, the labrum longer, and the male genitalia different.

Dorsally, *juquilensis* (Oaxaca) is also rather like *mistura*, but that species has hairs on the clypeus, the pronotal front angles acute, and in the male hairy tarsal pads and different genitalia.

Although I believe that they are probably this species, the majority of the 23 specimens from Oaxaca (Almoloya and Tehuantepec on the western side of the Isthmus) and Veracruz (Playa Vicente on the river of that name on the eastern side of the Isthmus, also Jalapa) differ from the type, paratypes, and other specimens from El Salvador, Honduras, and Chiapas, Mexico, as follows: the pronotum appears proportionately longer and in some specimens has the sides less subangulate, the elytra have the second interval unipunctate at least in the basal half, the clypeus is more narrowed to the front, with its margins less, or not at all, emarginate, so that it appears more or less rounded from side to side, as in *curvaticeps* (see below), and the size is slightly smaller. Worn specimens from El Salvador, however, present a somewhat similar aspect of the clypeus, and another specimen from El Salvador (Volcan Conchagua in the south) agrees in part with the Mexican specimens mentioned above by having the second interval of the elytra unipunctate throughout its length and the clypeus not emarginate in front. A specimen from Honduras has a strong post-clypeal tumidity. In view of these slight differences from various localities I have identified all these specimens as belonging to *mistura*, but, because more than one species may be concerned, I have included among the paratypes only those El Salvador specimens that agree with the type.

The specimens from Oaxaca and Veracruz resemble rather closely *curvaticeps* Fall (northeastern Mexico and Texas) by having the second interval of the elytra unipunctate and the clypeus rounded from side to side. They differ, however, by having the labrum longer and the pronotum shorter and much more coarsely and sparsely punctured. The

male genitalia, though of the same general kind in both species, have the lobes joined farther from the base in *mistura* and slightly different apices.

***Diplotaxis veracruzana* Vaurie, new species**

Figure 128

TYPE MATERIAL: Type, male, Zapuapan de Cabañas, 14 kilometers southeast of Lake Catemaco, Veracruz, Mexico, April 3, 1953, collected at a light trap (Islas, *in litt.*), deposited in the Instituto de Biología, Universidad Nacional, Mexico City; two male and one female paratypes, "Mexico," in the Zoologisches Museum, Berlin, one male, "Mexico," and one female paratype from Jalapa, Veracruz, in the American Museum of Natural History.

DIAGNOSIS: This small reddish species has the front of the head transversely tumid and the hind femora very narrow, more or less as in some of the species (*carinifrons*, *metallescens*, and *rita*) of the *simplex* group, but it differs from them by having a short, not long, labrum, the pygidium exceedingly roughly surfaced with crater-like punctures, almost tuberculate, and cleft at the middle in some specimens, and virtually flat mentum.

RANGE: The only exact localities of this species are in Veracruz, near the volcanic lake called Catemaco in the southeastern part of the state, and Jalapa northwest of the city of Veracruz.

DESCRIPTION OF TYPE, MALE: Length, 7.5 mm. Color dark red. Head sloping gently to clypeal suture which is obliterated at middle, unevenly, rather densely and confluent punctured, front of head transversely tumid, with an uneven punctate ridge. Clypeus without hairs, about one-half of the length of head, its punctures of same size as those on head, front margin slightly emarginate between rounded, broadly reflexed angles, sides bent inward in front of eyes. Eyes not sunk, each eye about one-fourth of the width of head. Antennae lacking [10-segmented in paratypes]. Mandibles small, narrow. Last segment of maxillary palpi not impressed basally. Labrum finely and densely punctured, slightly concave, level with and same length as reflexed under side of clypeus; front

margin scarcely arcuate. Mentum virtually flat, its apical declivity barely indicated by pubescent hind margin.

Pronotum flat, transverse, punctures of disc larger than those of head, deeply impressed and irregularly placed (some punctures widely separated, some confluent); center with impunctate space; sides widest at about middle, scarcely arcuate to narrowly acute front angles and to obtuse hind angles, angles not impressed. Scutellum punctured at base. Elytra three times longer than pronotum, punctures about same size and sparseness as those of pronotum; second interval irregularly unipunctate; costae flat, with smaller punctures; marginal hairs so short as not to be visible from above; epipleurae not widened apically; surface rather opaque, sericeous. Metasternum between coxae nearly twice as long as second abdominal segment. Propygidium not grooved, spiracles not prominent. Pygidium with raised, crater-like punctures that are densely but rather unevenly placed. Abdomen not ridged laterally.

Front tibiae with teeth equidistant and all three distinctly in front of middle. Hind femora only very faintly punctured, much narrower than second abdominal segment is long, and scarcely wider than hind tibiae, sides parallel. Middle tarsi with first two segments about equal in length, hind tarsi with first segment slightly shorter than second, hind tarsi longer than hind tibiae. Claws bent at right angles, cleft subapically, tooth nearly as long as claw. Genitalia nearly as in figure 128 of *chiricahuae*; basal piece not available.

SEXUAL DIMORPHISM: The type and other males have the hind femora, hind tibiae, and hind tibial spurs narrower than do females, the hind tibiae less flared apically, the pygidium more transverse. The hind femora are distinctly wider than the hind tibiae in females. The hind tibial spurs of females appear to be as wide as the base of the first tarsal segment (but specimens are in bad condition). The fifth abdominal segment is the same length in both sexes.

VARIATIONS FROM TYPE: The length of the paratypes is from 7 to 8 mm. The ridge on the head is interrupted at the middle in some specimens, the clypeus is more emarginate, with its front margin more reflexed, and has

sharper angles in three of the paratypes; in one paratype the clypeus is almost as long as the head; the labrum in one specimen is even shorter than the under side of the clypeus; the base of the pronotum is transversely depressed and impunctate in three paratypes, impunctate on the sides in only one, and one is like that of the type; the scutellum has many punctures in some specimens; the punctures of the elytra are wrinkled and indistinct in one paratype; the pygidium is more tuberculate in one paratype and is divided at the middle in three paratypes. In addition, some specimens have the elytra shining, not opaque, the second interval multipunctate except at the extreme base, and the costae convex.

REMARKS: The four paratypes from the Zoologisches Museum were identified, in what appears to be Moser's handwriting, as *carinifrons* Bates, a species of about the same size from Chiapas, Mexico, and Guatemala. This species differs from *veracruzana*, however, not only by having the labrum twice as long as the under side of the clypeus, but also by having large bulbous mandibles, a sinuate mental declivity, a broader clypeus, and the pronotum densely and finely punctured, the sides in front with two round impressions.

The type is the only male with exact locality and the only one with at least one complete leg of each pair; the other males lack either the middle or the hind tarsi. The salient characteristics of this species are the ridged head, divided or "bumpy" pygidium, virtually impunctate and very narrow hind femora, virtually glabrous margins of the elytra, and large, unevenly spaced, pronotal punctures.

***Diplotaxis elongata* Vaurie, new species**

Figure 227

TYPE MATERIAL: Type, male, J. Manuel, El Salto, Durango, Mexico, 9300 feet, June 10, 1937 [no collector given], and a female paratype in the American Museum of Natural History; also a female paratype from San Antonio, Durango [no date given], L. W. Saylor collection, in the California Academy of Sciences.

DIAGNOSIS: This elongate species resembles closely *parallela* (*brevicollis* group) in the

head, clypeus, pronotum (angles impressed), and elytra, but differs by having the labrum flat, not concave, and distinctly longer than the reflexed under side of the clypeus, and the male genitalia with more elongate lateral lobes, but shorter basal piece.

RANGE: Known only from southwestern Durango in northwestern Mexico. There are at least 13 localities in Durango with the name of San Antonio (one of the paratypes), but a number of them are in the same region as El Salto (type), and I have a specimen of *bowditchi* on which the label reads "San Antonio, 5000 ft., El Salto, Dgo., Mex. June 10, 1937." Probably "J. Manuel" and "San Antonio" are both districts of El Salto.

DESCRIPTION OF TYPE, MALE: Length, 10 mm. Color dark red. Head sloping obliquely to clypeal suture which is more or less obliterated at middle (head depressed on one side by mechanical injury). Head and clypeus uniformly densely punctured, clypeus without hairs, about one-half of the length of head, front margin weakly emarginate between rounded angles, reflexed by not more than width of margin; sides not sinuate, canthi not prominent. Eyes not sunk, each eye about one-fifth of the width of head. Antennae 10-segmented, club as long as funicle. Mandibles long but not bulbous. Maxillary palpi without basal impression. Labrum flat, faintly punctured, level with and twice as long at middle as reflexed under side of clypeus (the latter flat also). Mentum with declivity in apical third flat, its posterior margin arcuate, ridged, and pubescent.

Pronotum longer than head and clypeus combined, rather flat, punctures of disc sparser and somewhat larger than those of head, sides widest at middle, thence sinuate to rather acute front angles and obtuse but sharp hind angles, all angles impressed within, base not depressed. Scutellum punctured densely. Elytra three times longer than pronotum, with same kind of punctures; second interval multipunctate (two rows); costae rather flat, with single row of smaller punctures; marginal hairs very sparse (worn?) and shorter than width of a sutural interval; epipleurae wider before apex than opposite second abdominal segment. Metasternum between coxae twice as long as sec-

ond abdominal segment. Pygidium with large, irregularly spaced, deep punctures. Propygidium not grooved; spiracles not prominent. Abdomen not ridged laterally.

Front tibiae (teeth rather worn) with all three teeth distinctly in front of middle. Hind femora with single row of punctures between submarginal punctures. Middle tarsi missing (in paratypes first segment longer than second); hind tarsi with first two segments of about same length, hind tarsi longer than hind tibiae. Claws bent at right angles at middle, tooth wider than and nearly as long as apex of claw and pressed close to it. Genitalia as in figure 227 of *connata*; basal piece nearly one-third shorter than lobes.

SEXUAL DIMORPHISM: The male (type) differs from the two females by having the pygidium more transverse, the hind tibial spurs narrower and the longer one equal in length to the first hind tarsal segment (not longer, as in females), the hind femora narrower, parallel-sided (not slightly sinuate on lower edge, as in females), and the hind tibiae with less apical flare.

VARIATIONS FROM TYPE: The paratypes measure 10.5 and 11 mm. in length; one has the punctuation of the head so dense as to be confluent; the female from J. Manuel, El Salto, has the canthi angulate and prominent, the labrum not quite so long, and the front margin of the clypeus more emarginate. Both paratypes have the margin somewhat more reflexed than does the type. There is a trace of a groove on the propygidium in the paratypes.

REMARKS: This species, although dorsally like *parallela*, is certainly not associated with that species as far as the labrum is concerned. The labrum is long and flat as in the species of the *simplex* group, none of which is known to occur as far north and west in Mexico as *elongata*, and none of which has the hind angles of the pronotum impressed.

At the same locality and in the same month, many specimens were collected (probably by the same collector) of a species (*saltensis*) of the *trapezifera* group (hairy clypeus), as well as a few individuals of *bowditchi* (*puberea* group).

Both front tarsi on the type and most of the hind tarsi on the paratypes are missing,

and the marginal hairs of the elytra are mostly worn off.

***Diplotaxis turgidula* Vaurie, new species**

Figures 224, 226

TYPE MATERIAL: Type, male, 6 miles north of Jacala, Hidalgo, Mexico, 6000 feet, June 23, 1955, P. and C. Vaurie, collectors, and 30 paratopotypes, of which the type and 22 paratypes are in the American Museum of Natural History; other paratypes in Instituto de Biología, Mexico City; Rockefeller Foundation Agricultural Program, Mexico City; Zoologisches Museum, Berlin; British Museum; California Academy of Sciences; University of California at Berkeley; University of Michigan; and United States National Museum.

DIAGNOSIS: This species is characterized by its convex, sparsely punctured pronotum, with non-acute and non-impressed angles, long (as long as head), strongly reflexed, and emarginate clypeus, transversely tumid front of the head (the tumidity very slight in some specimens), large eyes, virtually impunctate hind femora between the submarginal rows of punctures, flat labrum (neither very long nor very short), and strongly curved male genitalia (fig. 226). It appears to be most similar to *assimilis* (see diagnosis of that species).

RANGE: Known only from the type locality in the mountains above Jacala and from one female from Jacala, July 1, 1951, K. Hinchcliff, collector. Seventy-six additional specimens (23 males, 53 females) have been seen with the same data as the type.

HABITAT: All the specimens from 6 miles north of Jacala were collected at night, either from a lighted sheet on the ground or from low bushes, in an open area of grass and rocks and juniper by the side of the highway. Most of the series were picked from two species of *Rhus*, known locally as *hierba de guajalote*, or *chungwa*. The vegetation showed signs of having been eaten.

DESCRIPTION OF TYPE, MALE: Length, 10 mm. Color dark red. Head densely punctured, convex to clypeal suture which bends back at middle but is not truly impressed, front of head transversely tumid, with even denser, more concentrated punctures than

rest of head, forming slight ledge or frown over clypeus. Clypeus without hairs, nearly as long as head, punctures of same size as those on head, but less dense, front margin emarginate at middle, broadly reflexed in apical third, even more reflexed behind rounded front angles, sides obliquely narrowing to front. Eyes not sunk, each eye a little less than one-fourth of width of head. Antennae 10-segmented, club same length as funicle. Mandibles small, narrow, not bulbous. Maxillary palpi with dorsal flattened area at base of last segment. Labrum flat, densely punctured, level with and no longer medially than reflexed under side of clypeus, front margin scarcely arcuate. Mentum declivous at anterior third, declivity flat, its hind margin arcuate, margined, and pubescent.

Pronotum almost twice as long as length of head and clypeus combined, very convex, transverse, sides widest slightly behind middle and strongly, uniformly rounded to front and hind angles which are obtuse and not impressed, punctures of disc smaller than those on head, shallowly impressed and sparse. Scutellum punctured. Elytra nearly three times longer than pronotum, densely punctured with larger punctures than those on pronotum; second interval multipunctate; costae slightly convex and with smaller punctures; marginal hairs sparse, about as long as one sutural interval is wide; epipleurae narrow to apex. Metasternum between coxae twice as long as second abdominal segment. Pygidium with sparse punctures of same size as those on sides of last abdominal segment. Propygidium not grooved or ridged but with dense punctures; spiracles fairly prominent (are black on red surface). Abdomen not ridged.

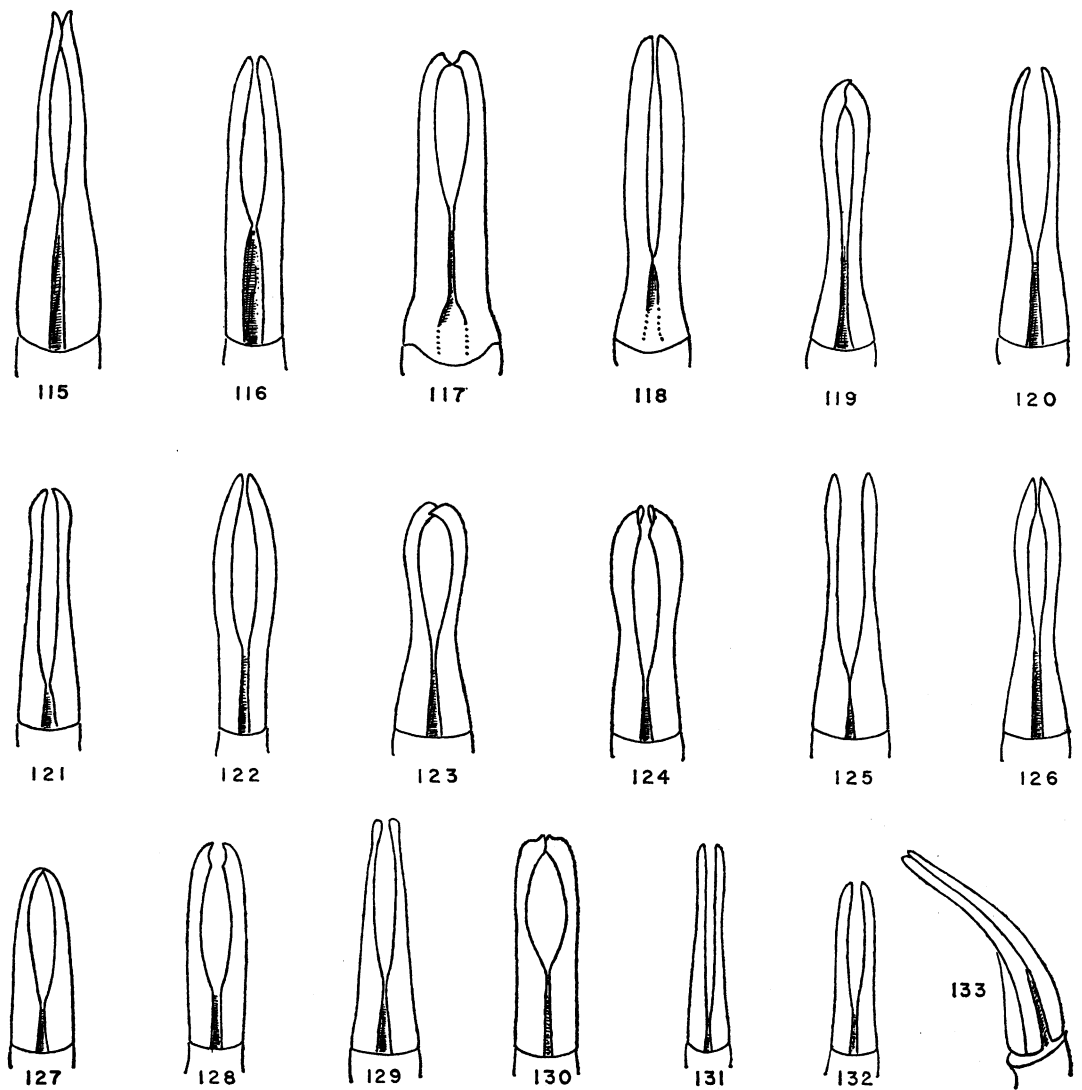
Front tibiae with all three teeth in front of middle, two apical ones very close together. Hind femora impunctate, slightly narrower than second abdominal segment is long. Middle tarsi with first segment scarcely longer than second, hind tarsi with first two segments about equal in length, hind tarsi slightly longer than tibiae. Claws bent at right angles, cleft subapically, tooth close to and almost as long as claw. Genitalia as in figures 224 and 226; basal piece about same length as lobes.

SEXUAL DIMORPHISM: The type and other males have the hind tarsi at least as long as the hind tibiae (a little shorter than the tibiae in females), the first segment of the hind tarsi the same length as the longer of the two tibial spurs (not shorter than this spur is in females), the hind tibial spurs and hind femora considerably narrower than those of females. The pygidium is scarcely more transverse in males. The longer of the hind tibial spurs in females is as wide as or wider than the base of the first segment of the hind tarsi (fig. 26), and the first segment of the hind tarsi is shorter than the second.

VARIATIONS FROM TYPE: The length ranges from 8.5 to 11 mm. Some specimens vary by having: the ridge behind the clypeal suture only weakly indicated; the clypeus shorter, i.e., not so long as the head; the front margin of the clypeus nearly straight; the clypeal suture noticeably impressed and bending backward at middle in a shallow V, or the suture obliterated by punctures; the labrum sparsely punctured; the declivity of the mentum with its hind margin straight; the pygidium densely punctured; the scutellum sparsely punctured; and the hind femora with a few minute, shallow punctures. A female specimen has the front margin of the clypeus notched on both sides, much as it is in the quadridentate species of the *trapezifera* group, but it is unquestionably this species.

REMARKS: This species has many of the characters present in *assimilis* (Michoacan and Guerrero), a species with almost exactly similar head and clypeus, but which differs in the male genitalia and in the pronotum, as stated under that species. The long clypeus and the ledge or frown on the front of the head recall those of *metallescent* Bates (*simplex* group) from southwestern Mexico, but that is a smaller species, differing not only in the acuminate apices of the male genitalia, but also in the long labrum (twice as long as the under side of the clypeus) and sinuate mentum.

In general size, shape, and color *turgidula* resembles another species of western Mexico, *barbarae* (*atramentaria* group), but differs from it by having a frown on the head, the tarsi much shorter, the elytral costae rather convex, not flat, and punctured densely, not

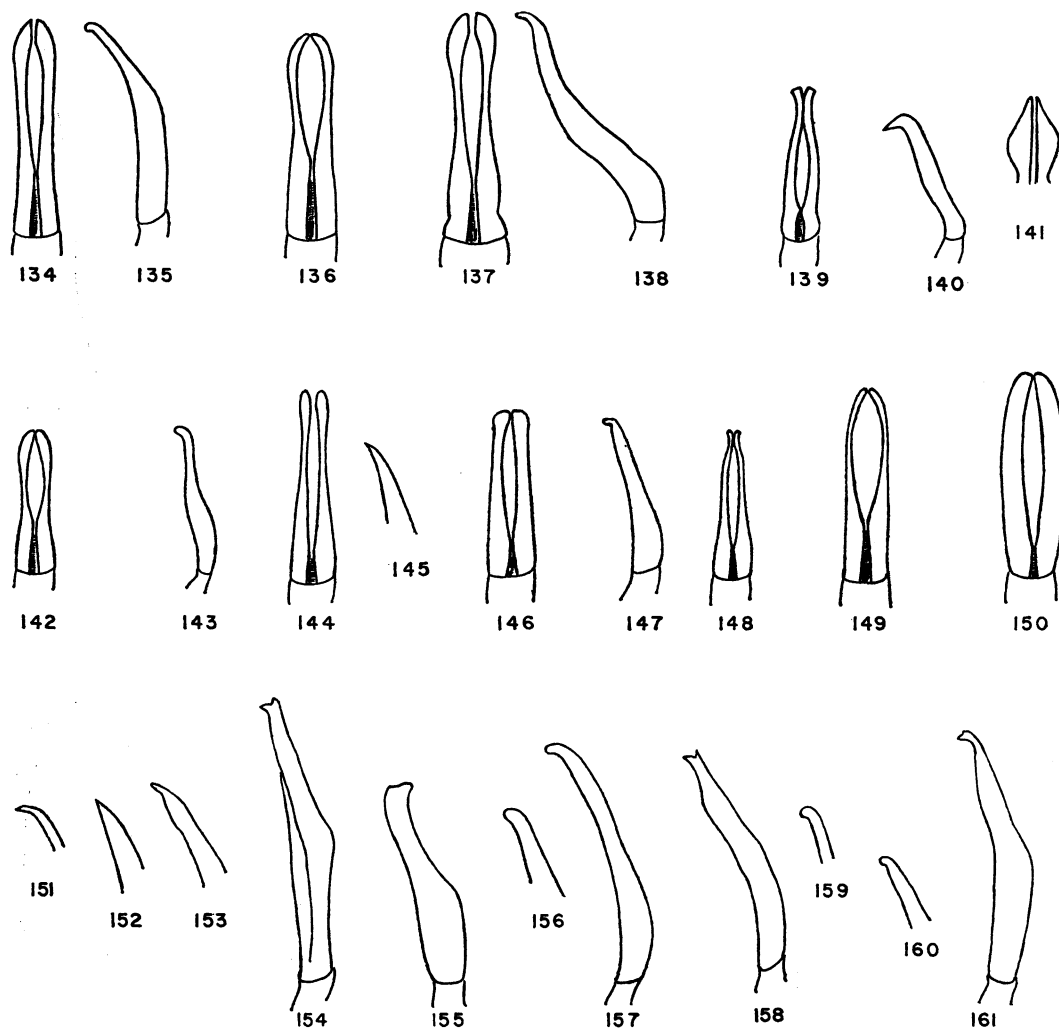


FIGS. 115-133. Dorsal views of lateral lobes (parameres) of male genitalia of *trapezifera* group of *Diplotaxis*, showing part of basal piece. 115. *D. trapezifera*; characteristic also of *D. durango*. 116. *D. denigrata*; characteristic also of *D. sonora* (but see text) and *tepicana*. 117. *D. denticeps*; characteristic also of *D. fissilis*. 118. *D. tumida*. 119. *D. mediafusca*. 120. *D. angularis*; characteristic also (but see text) of *D. iguala* and *macrotarsus*. 121. *D. angustula*; characteristic also of *D. concava* and *marina* (but see text). 122. *D. tehuana*. 123. *D. catarinas*; characteristic also of *D. pumila*. 124. *D. megapleura*. 125. *D. superflua*. 126. *D. saltensis*. 127. *D. hirtipes*. 128. *D. chiricahuae*; characteristic also of *D. cribraticollis*, *dissona*, *latispina*, *sparsa*, and *veracruzana*. 129. *D. glabrimargo*. 130. *D. cribriceps*. 131. *D. bicolor*. 132. *D. parvula*; characteristic also of *D. consentanea*, *femoralis*, and *yucateca*. 133. *D. crucis*, three-quarter view.

sparsely, and different male genitalia. Other members of the *atramentaria* group differ from *turgidula* by having the elytral costae virtually impunctate.

Many species of the *frondicola* group bear some resemblance to *turgidula*, mainly be-

cause of their large, convex pronotum, but *turgidula* differs from them in one or more of the characters given in the diagnosis. The species of this group most similar to *turgidula* is the variable *thoracica* (from farther north in Mexico and from the southwestern United



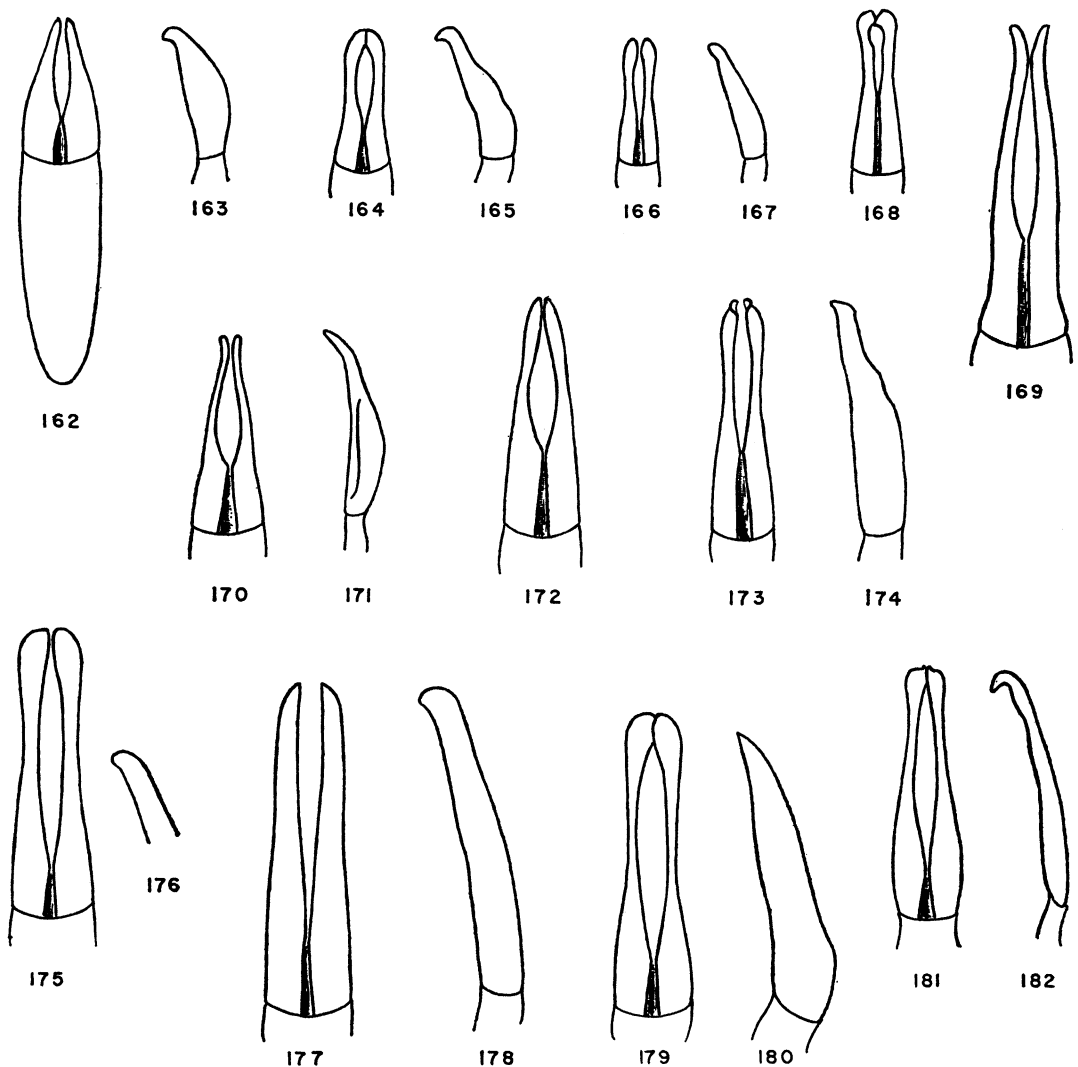
FIGS. 134-150. Lateral lobes of male genitalia of *trapezifera* group of *Diplotaxis*. Views are dorsal unless otherwise stated. 134. *D. nigriventris*. 135. *D. nigriventris*, profile. 136. *D. pala*, characteristic also of *D. roberti* (but see text). 137. *D. incisa*. 138. *D. incisa*, profile. 139. *D. bifida*; characteristic also of *D. rufipes*. 140. *D. bifida*, profile; characteristic also of *D. rufipes*. 141. *D. bifida* and *rufipes*, apices enlarged. 142. *D. academia*. 143. *D. academia*, profile; characteristic also of *D. mascula*. 144. *D. confusa*; characteristic also of *D. residua*, *schaefferi*, and *tenebrosa*. 145. *D. confusa*, profile. 146. *D. polita*. 147. *D. polita*, profile. 148. *D. mascula*. 149. *D. flexa*. 150. *D. parpolita*; characteristic also of *D. anthracina*.

FIGS. 151-161. Profile views of lobes of male genitalia or their apices. 151. *D. trapezifera*; characteristic also of *D. angularis* and *durango*. 152. *D. denigrata*; characteristic also of *D. tepicana*, *sonora*, *tumida*, and *parvula*. 153. *D. mediafusca*. 154. *D. denticeps*; characteristic also of *D. fissilis*. 155. *D. cribriceps*. 156. *D. angustula* and *parpolita*. 157. *D. tehuana*. 158. *D. catarinas*. 159. *D. chiricahuae* and *megapleura*. 160. *D. superflua*; characteristic also of *D. flexa*, *glabrimargo*, and *hirtipes*. 161. *D. saltensis*.

States), which nonetheless differs in the important character of the male genitalia. In addition, *thoracica* has the pronotum densely, not sparsely, punctured, less transverse and proportionately longer, the clypeus more or

less rounded from side to side, and the hind femora stouter.

Other species collected at the same time and place as the type and paratopotypes are *fossifrons* (*simplex* group) and three hairy



FIGS. 162–182. Lateral lobes of male genitalia of *Diplotaxis*. Views are dorsal unless otherwise stated. 162. *D. misella*, showing long basal piece. 163. *D. misella*, profile. 164. *D. incuria*. 165. *D. incuria*, profile. 166. *D. deserta*; characteristic also of *D. pinalica* and *brachyptera*. 167. *D. deserta*, profile. 168. *D. brevicornis*. 169. *D. juquilensis*. 170. *D. laeivertex*. 171. *D. laeivertex*, profile. 172. *D. amecameca*. 173. *D. errans*. 174. *D. errans*, profile. 175. *D. sulcatula*; characteristic also of *D. beyeri*, *corbula*, *fimbriata*, *puncticeps*, *punctipennis*, *rotunda*, *saylori*, and *sierrae*. 176. *D. sulcatula*, profile. 177. *D. corvina*. 178. *D. corvina*, profile. 179. *D. lengii*. 180. *D. lengii*, profile. 181. *D. thoracica*; characteristic also of *D. basalis*. 182. *D. thoracica*, profile.

species, *puncticollis* and *hirsuta* (*puberula* group), and *jacala* (*puberea* group).

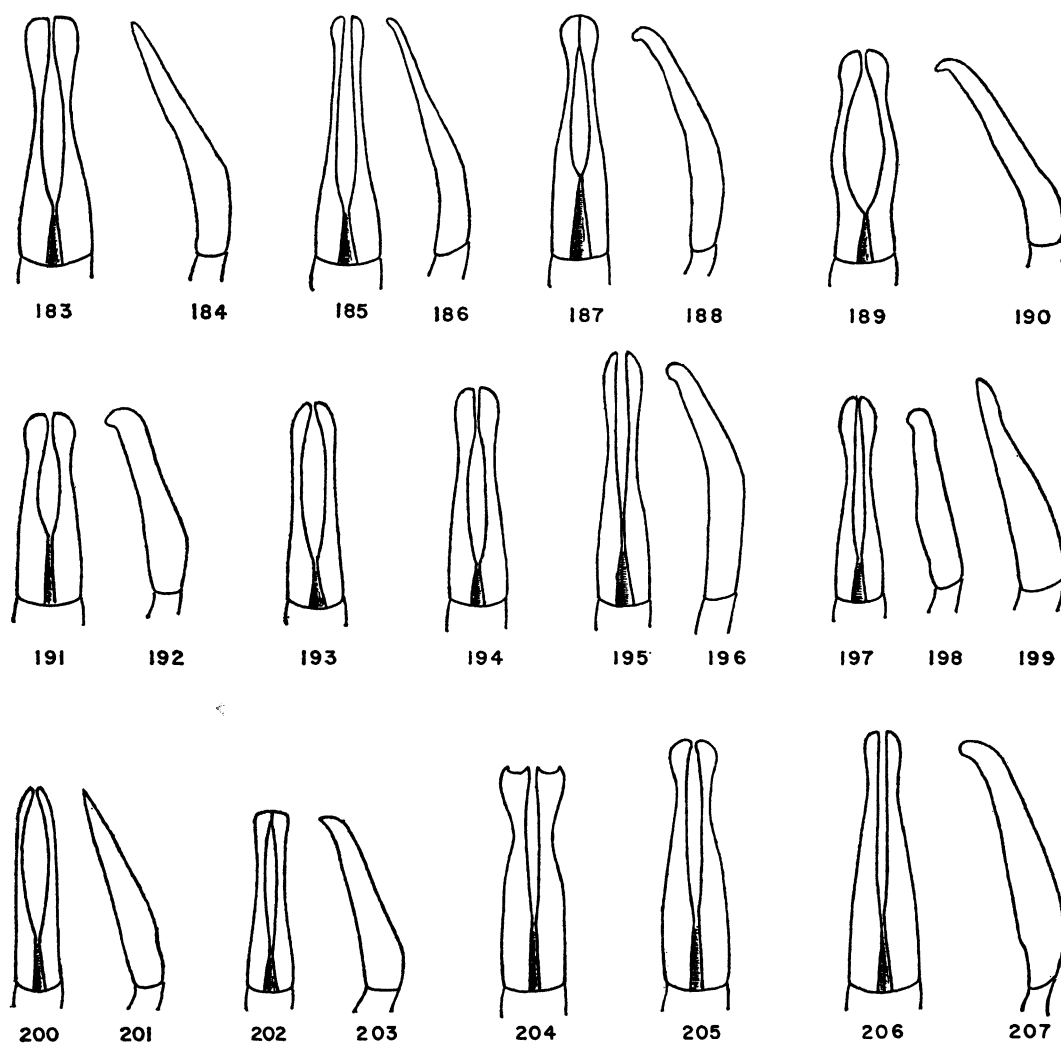
***Diplotaxis assimilis* Vaurie, new species**

Figures 217, 218

TYPE MATERIAL: Type, male, 15 miles east of Morelia, Michoacan, Mexico, junction of

Highway 4 and Huetamo Road, 2100 meters, July 8, 1947, T. H. Hubbell, collector, in the University of Michigan; one female paratype, 25 kilometers east of Morelia, June 14, 1955, "at light," R. B. and J. Selander, collectors, in the American Museum of Natural History.

DIAGNOSIS: The head, eyes, and clypeus are almost like those of *turgidula* (except for

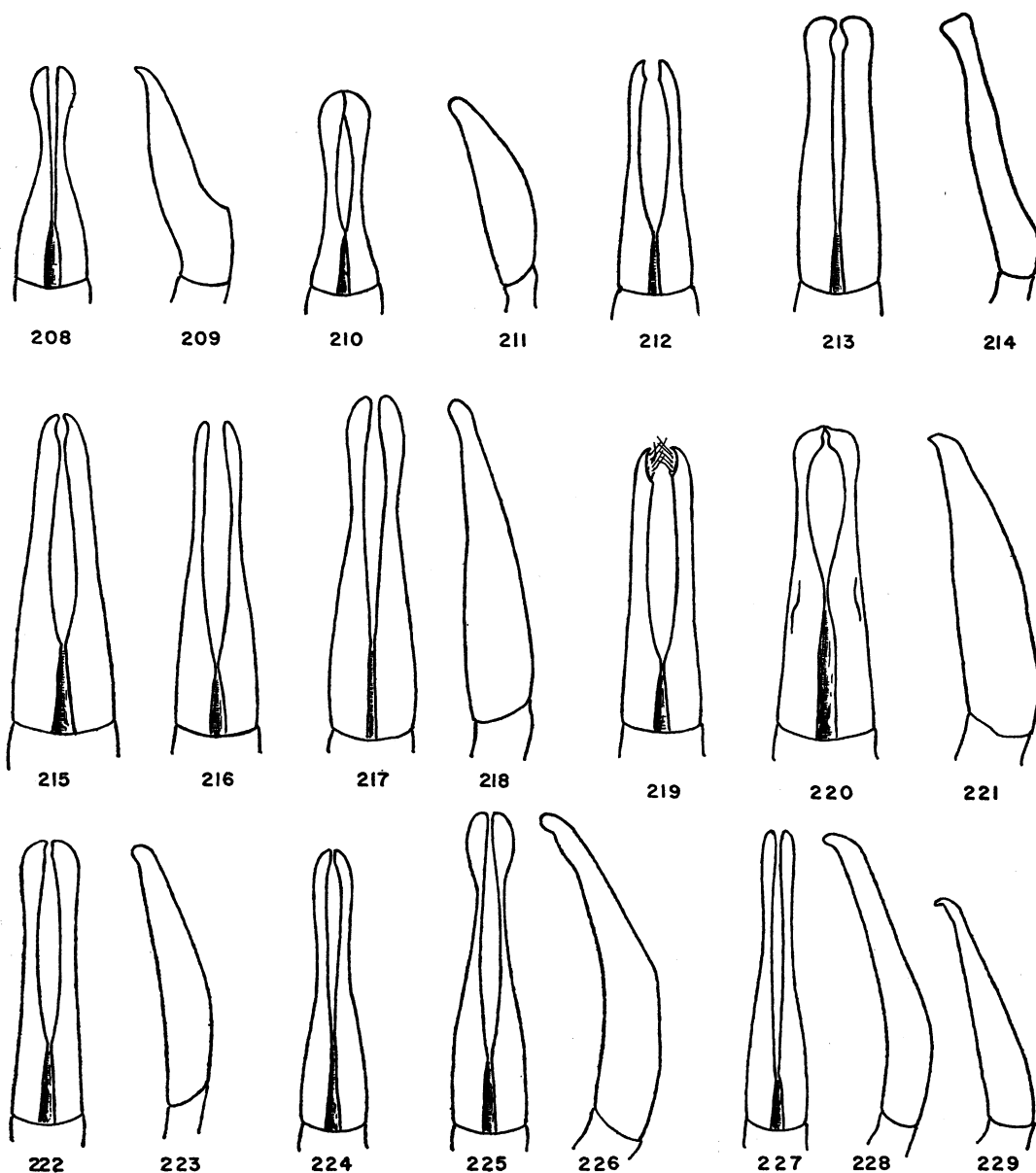


FIGS. 183-207. Lateral lobes of male genitalia of *Diplotaxis*. Views are dorsal unless otherwise stated. 183. *D. urbana*. 184. *D. urbana*, profile. 185. *D. blanchardi*; characteristic also of *D. rosae*. 186. *D. blanchardi*, profile. 187. *D. harperi*; characteristic also of *D. texana*. 188. *D. harperi*, profile. 189. *D. fulva*. 190. *D. fulva*, profile. 191. *D. dubia*. 192. *D. dubia*, profile. 193. *D. frondicola*; characteristic also of *D. carbonata*, *convexilabrum*, *curvaticeps*, *ingenua*, and *rufiola*. 194. *D. punctatorugosa*; characteristic also of *D. bidentata*, *languida*, and *rufa*. 195. *D. muricata* (type a; see text). 196. *D. muricata* (type a), profile. 197. *D. muricata* (type b; see text). 198. *D. muricata* (type b), profile. 199. *D. carbonata* profile; characteristic also of *D. rufiola*. 200. *D. pacata*. 201. *D. pacata*, profile. 202. *D. subangulata*; characteristic also of *D. brevisetosa*. 203. *D. subangulata*, profile. 204. *D. planidens*; characteristic also of *D. ambigua*. 205. *D. australis*. 206. *D. missionaria*. 207. *D. missionaria*, profile; characteristic also of *D. australis*.

the more angulate canthi), but the pronotum differs by having a basal depression, denser punctures, less uniformly rounded sides, and by being less transverse; *assimilis* differs further by having horizontal, not curved lobes in the male genitalia, more and deeper punc-

tures on the hind femora, and, in the female, narrow hind tibial spurs.

RANGE: Morelia and vicinity in northern Michoacan in central Mexico and (probably) the highlands of Guerrero to the southeast. In addition to the type and paratype, a fe-



FIGS. 208–229. Lateral lobes of male genitalia of *Diplotaxis*. Views are dorsal unless otherwise stated. 208. *D. maura*. 209. *D. maura*, profile. 210. *D. pygidialis*. 211. *D. pygidialis*, profile. 212. *D. mexcala*. 213. *D. macronycha*. 214. *D. macronycha*, profile. 215. *D. kuschei*. 216. *D. atramentaria*; characteristic also of *D. commixta* (but see text) and *tztzio*. 217. *D. microchele*; characteristic also of *D. assimilis* and *subcostata*. 218. *D. microchele*, profile. 219. *D. barbarae*; characteristic also of *D. exstans* and *sinuans*. 220. *D. circulans*. 221. *D. circulans*, profile. 222. *D. brevicollis*; characteristic also of *D. conformis*, *decima*, *punctulata*, and of 21 species of *brevicollis* group. 223. *D. brevicollis*, profile. 224. *D. turgidula*; characteristic also of *D. mistura*. 225. *D. parvicollis*; characteristic also of *D. marginicollis*. 226. *D. parvicollis*, profile; characteristic also of *D. turgidula*. 227. *D. connata*; characteristic also of *D. elongata* and *D. mentalis*. 228. *D. connata*, profile. 229. *D. rosae*, profile.

male specimen in the British Museum from Xucumanatlan, Guerrero, 7000 feet, July, H. H. Smith, collector, has been examined; this locality is a small settlement not far from Chilpancingo.

DESCRIPTION OF TYPE, MALE: Length, 10 mm. Color dark red. Head and clypeus as in *turgidula*, except for the suture which is not bent backward and for the sides of the clypeus which are strongly bent inward, thus making the canthi prominent. Eyes, antennae, mandibles, and palpi as in *turgidula*, but palpi are actually impressed. Labrum and mentum as in *turgidula*, except that declivity of mentum is less well marked.

Pronotum one and one-half times longer than length of head and clypeus combined, not noticeably convex, sides widest behind middle, slightly sinuate to obtuse but sharp front and hind angles, punctures of disc larger than those on head and sparse, deeply impressed; center at base with longitudinal impunctate space, base transversely impressed. Scutellum punctured at base. Elytra three times longer than pronotum, densely punctured with punctures of same size as those on disc of pronotum; elytra otherwise as in *turgidula*. Metasternum, propygidium, and abdomen as in *turgidula*. Pygidium uniformly densely punctured. Spiracles not at all prominent.

Front tibiae, hind femora, middle tarsi, and claws as in *turgidula*, but femora even narrower and with two rows of punctures between the submarginal rows. Hind tarsi missing. Genitalia as in figures 217 and 218 of *microchele*, but proportionately more elongate and less robust.

SEXUAL DIMORPHISM: The male (type) has narrower hind femora than females and more transverse pygidium. Both sexes have narrow hind tibial spurs, but further comparison of the hind legs is not possible, because the type lacks these tarsi.

VARIATIONS FROM TYPE: The paratype agrees very well with the type, except that it has the labrum slightly shorter than the under side of the clypeus and the last segment of the palpi flattened, not impressed. The specimen from Guerrero, however, differs by measuring 9.5 mm., by having no frown on the head, the clypeal suture visibly im-

pressed, the clypeus (perhaps worn) shorter and scarcely emarginate in front, the pronotum with the hind angles rounded off, the sides wider at base where they are nearly parallel, the punctures no larger than those of the head, the marginal hairs of the elytra entirely lacking (worn?), and the third tooth of the front tibiae more anterior.

REMARKS: The clypeus in the type is very much like that in some specimens of *beyeri* from Texas and northeastern Mexico, a species quite different in other respects.

As can be seen above under variations, the specimen from Guerrero presents a number of differences from the type and paratype. This specimen appears in the supplement to the "Biologia" (Bates, 1889, p. 397), as species number 6 (A) with the notation by Bates, "A single example; indeterminable."

INCERTAE SEDIS

Diplotaxis tenuis LeConte

Diplotaxis tenuis LECONTE, 1856, p. 271 (Vallecitas, San Diego County, California; type, male, in the Museum of Comparative Zoölogy).

This species is in either the *misella* or *trapezifera* groups, but, as its author said, it "cannot be referred to its proper division, from the loss of the head." I have examined the type and find that it lacks not only the head but also the genitalia. Unless some future worker can utilize this remnant of the body, this species should be removed from the genus.

Fall (1909, p. 91) placed *tenuis* at the end of his classification, after *angularis*, *aenea*, and *misella*, and redescribed it from a specimen in his own collection (from western Arizona) which he had compared with the type. He mentions a character of the type not mentioned by LeConte or noticed by me, i.e., that the hind coxal plate is scarcely punctured, almost smooth, a characteristic of *deserta* Fall (California) and the species of the *misella* group. The fact that the elytral costae are not punctured would also seem to associate this species with *deserta*. Fall's *deserta*, however, was described much later than *tenuis*, and it does not appear realistic to synonymize it with a species lacking such important parts as the head and the genitalia.

Diplotaxis ebenina Blanchard

Diplotaxis ebenina BLANCHARD, 1850, p. 170 (Martinique).

Although I have stated previously (Vaurie, 1958, p. 389) that this form had not been mentioned since 1855, I find that I had overlooked it in "Coléoptères des Antilles" (Fleutiaux and others, 1947, p. 50) where it is redescribed by R. Paulian and illustrated by A. Villiers (fig. 47). The description by Paulian, however, errs in stating that there is a fine dorsal pubescence (Blanchard says the dorsum is shining), because Villiers has kindly reexamined the type in the Paris Museum for me, and the pubescence is on the under side only. He tells me also that the clypeus is somewhat less broadly emarginate in front than shown in his figure (Blanchard says it is truncate), and that he finds no lateral abdominal ridge. This insect, therefore, could be the same as *atlantis* Fall, 1909, from the eastern United States and the island of Guadeloupe, a name that would then become a synonym, but no decision can be made without further examination of the type. The latter, according to Villiers, is in very bad condition.

FOSSIL SPECIES

Two fossils have been described by H. F. Wickham from the Miocene shales of Florissant, Colorado, neither of which I have examined.

Diplotaxis aurora Wickham

Diplotaxis aurora WICKHAM, 1913, p. 294, pl. 25, fig. 2 (type in the United States National Museum).

This species is "represented by an elytron about the size of that of the recent *D. brevicollis* LeConte, which occurs in the same general region." The elytron is a reverse, and is 9.50 mm. long. Wickham says that he feels "quite satisfied with the generic reference." The sutural margin and the costae, however, are said to be impunctate and are so shown in the figure, but this condition is not true of modern species, all of which have punctures on the suture, even those species that have the costae virtually impunctate.

Diplotaxis simplicipes Wickham

Diplotaxis (?) *simplicipes* WICKHAM, 1912, p. 25, pl. 6, fig. 9 (type in the Museum of the University of Colorado).

A short description is given of this specimen, which shows the under side from the middle legs to the apex of the venter and the upper side of the head, pronotum, and part of one elytron. If this is a specimen of *Diplotaxis*, it is a fairly large one (10.25 mm.; elytron, 7.25 mm.) and represents a form with rounded clypeal outline and small eyes. In my opinion, the middle femora, as shown, are too bulbous and wide for *Diplotaxis*; they are more like the hind femora of some present-day species. The hind tibiae are not flared out apically as in most modern species.

APPENDIX: SPECIMENS EXAMINED

FOR CONVENIENCE, THE SPECIES are listed alphabetically. Species for which only a few localities have been reported are treated more fully in the paragraphs on range under the respective species in the main text. For the United States and Mexico, the states are listed more or less from north to south.

Diplotaxis academia Vaurie

In addition to the type series from Miraflores, the following specimens have been examined, the majority collected in 1938 and 1941 by Ross, Bohart, and Michelbacher:

MEXICO: *Baja California*: Cape San Lucas, 2; Triunfo and vicinity, July, 195; Todos Santos, Oct., 8; 15 miles west of La Paz, July, 3; 5 miles west of San Bartolo, July, 20; Santiago, July, 3; Miraflores and vicinity, July, 155; Agua Caliente, Cape region, Oct., 5; Las Animas, Sierra Laguna, Oct., 49; San Venancio, Oct., 5; Canipole, Oct., 1; Comondu, July, 1; San Quintin, Aug., 1; 25 miles south of Santa Rosalia, July, 1; 5 miles south of San Miguel, July, 1; Palmarita [not located], Oct., 1923, 2; "L[ower] Cal.," "Beyer," 3.

Diplotaxis aequalis Cazier

UNITED STATES: *Arizona*: Geronimo, July, 1 ♂; Globe, July, 1935, 1 ♀ (type); Middle Pioneer Camp, Pinal Mts., Aug., 1 ♂; Oak Creek Canyon, Aug., 1 ♂, 1 ♀; Patagonia, July, 1 ♀; Pinal Creek, Globe, June, 1 ♂, 1 ♀; Pinal Mts., 1 ♀ (paratype), Aug., 1935, 1 ♂ (paratype), 4 ♀; Prescott, 1 ♂; Sierra Ancha Mts., 1 ♂; Wet Canyon, Graham Mts., Aug. 3 ♀.

Diplotaxis ambigua Fall

UNITED STATES: *Arizona*: Baboquivari Mts. (Browns Canyon, Kits Peak), 4; Badger, 1 ♂, 1 ♀; Black Dike, Sierritas Mts., 1 ♂; Coyote Mts., 10; Goldfield; Madrona Canyon Ranger Sta., Rincon Mts., 4 (including the type); Nogales, 24 ♀; Patagonia, 103; Patagonia Mt., Pima Co., 1 ♂; Sabino Canyon, Santa Catalina Mts., 4; Santa Rita Mts., 7 ♂, 18 ♀; Tucson, 7.

MEXICO: *Sonora*: Alamos, June, July, 2 ♂, 3 ♀; 10 miles west of Alamos, July, 1954, 13; Minas Nuevas, June, 4 ♀, Aug., 1952, 37; 25 miles south of Llano, July, 1950, 1 ♂; Santa Rosa Ranch, north of Navojoa, Aug., 1952, 6; Tepara, Rio Mayo, 1 ♂; Vinaterio [Vinateria?], 1 ♂, 1 ♀.

Diplotaxis angularis LeConte

UNITED STATES: *Arizona*: Cochise, 1 ♀; Chiricahua Mts., 1 ♀; Douglas, 2; Elgin, 1 ♂; Tombstone, 2 ♀; "Gila River," 1 (type of *angularis*).

New Mexico: Glencoe, 2; Silver City, 1 ♂. *Oklahoma*: Oklahoma City, 1 ♂. *Texas*: Marathon, about 30; Alpine, 1 ♀ (type of *producta*), 3 ♂; Fort Davis, 1 ♀; Madera Canyon State Park in Davis Mts., 1 ♂, 1 ♀; Davis Mts., 4.

MEXICO: States of Durango, Chihuahua, Zacatecas, Aguascalientes, Colima, Jalisco, Guerrero, Michoacan, Guanajuato, Morelos, Distrito Federal, Hidalgo, San Luis Potosi, Puebla, and Oaxaca.

Diplotaxis angustula Moser

MEXICO: *Veracruz*: Jalapa, 1 ♀. *Guerrero*: La Venta, 1 ♂; Acapulco, 1 ♀. *Colima*: Santiago Bay, 1 ♀; Armeria, 4; Manzanillo, 4. *Oaxaca*: Oaxaca, 55; Tehuantepec, 4 ♂; Zaachila, 2 ♂; Juquila, 1 ♂; Puerto Angel, 1 ♂; Salina Cruz, 1 ♂. *Chiapas*: 10 miles west of Tuxtla Gutierrez, 50; 3 miles southwest of Tonola, 4; El Zapotal, Tuxtla Gutierrez, 6.

GUATEMALA: 2 ♂ (including the type), 1 ♀; Guatemala City, 6; Panajachel, 12; Ayutla, 1 ♂; Coyotenango, 2 (cotypes); Yepocapa, 3; Palin, 1 ♂.

EL SALVADOR: San Salvador, 34; Santa Tecla, 1.

Diplotaxis anthracina Fall

MEXICO: *Baja California*: Las Animas, Sierra Laguna, Oct., 1 ♀; Miraflores and vicinity, July, 5 ♀; 15 miles north of El Refugio, July, 3 ♀; 5 miles west of San Bartolo, July, 1 ♂, 2 ♀; 3 miles north of San Pedro, July, 1 ♂; Triunfo and vicinity, July, 41 ♂, 19 ♀ [the foregoing are in the region of the Cape]; 20 miles north of Comondu, July, 2 ♂; Mesquital, July, 1 ♀; 15 miles north of Punta Prieta, July, 2 ♂, 3 ♀; 5 miles south of San Miguel, July, 1 ♂.

Diplotaxis arctifrons Bates

MEXICO: *Chihuahua*: Canyon Prieto, near Primavera, 7; Catarinas, 141; 92 kilometers north of Chihuahua, 1; 12 miles northwest of Gran Morelos, 5; Huejotitlan and vicinity, 248; Ojo Laguna, 46; 15 miles east of Parral, 6; Primavera, 57; Santa Barbara and vicinity, 101; Santa Clara and vicinity, 138; Valle de Olivos, 2. *Durango*: Durango, 53 (including the type); Encino, 10; San Isidro, Cuencame District, 2; Tepehuanes, 5; Villa Madero, 13; San Juan del Rio, 19. *Zacatecas*: Zacatecas, 2 ♂, 2 ♀; 15 kilometers east of Sombrecete, 2. *Jalisco*: Matanzas, 14; Lagos, 1 ♀. *San Luis Potosi*: Tepetate, 1 ♂, 1 ♀; San Luis Potosi, 1 ♂, 1 ♀. *Hidalgo*: Zimapan, 1 ♂.

Diplotaxis atlantis Fall

UNITED STATES: *New Hampshire*. *Massachusetts*: Beach Bluff; Chicopee (a paratype); Dorchester (a paratype); Fall River; Forest Hills;

Segreganset. *Rhode Island*: 1 ♂ (the type); Warwick; Watch Hill. *Connecticut*: Bradley; Fairfield; Lyme; New Haven; Sheffield Is.; Stamford; Storrs. *New York*: (A paratype); Babylon; Bear Mt.; Brooklyn; Cold Spring Harbor; Far Rockaway; Flushing; Great Gull Is.; Jamaica; Long Beach; New York City; Orient; Pelham; Westbury. *New Jersey*: Chester; Dunellen; Fort Lee; Fort Myers; Lavalette; New Brunswick; Passaic; Paterson; Ramsey; S. Orange; Tuxedo. *Pennsylvania*: Boyertown; Delaware Water Gap; Easton; Kempton; Lebanon. *District of Columbia*. *Maryland*: Glen Echo. *Michigan*. *Illinois*: Hardin, 1. *Iowa*: Ames, 2; Ottumwa, 1. *Arkansas*: Mt. Nebo, Yell Co., 1; Washington Co., 1. *Missouri*: Kirkwood, 1. *Oklahoma*: Hinton, 3 ♂, 1 ♀ (type and paratype of *nigra*). *Kansas*: Jefferson Co., 1. *Nebraska*: Malcolm, 1.

"GOUADELOUPE" [WEST INDIES?]: 1.

Diplotaxis atramentaria Bates

MEXICO: *Hidalgo*: Pachuca, 1 ♀. *Morelos*: Alpujeca, 4 ♀; Cuernavaca, 39 (including lectotype); Hermosa, 1 ♀; Progreso, 14; Yautepec, 1 ♀. *Puebla*: Esperanza, 1 ♂; Petalcingo and vicinity, 9; Tecamachalco, 3; Tehuacan, 6. *Mexico*: Chapingo, 1 ♀. *Veracruz*: Medellin, 1 ♀. *Guerro*: Acapulco, 1 ♀; Chilpancingo, 1 ♀; El Mogote (near. Taxco); 44; Taxco, 1 ♀; Teloloapan, 3.

Diplotaxis atratula LeConte

UNITED STATES: *New Mexico*: Frontera, 2 (syntypes); 18 miles north of Rodeo, Peloncillo Mts., July, 1956, 1 ♂; Pyramid Peak, July, Aug., 1930, 6. *Texas*: Big Bend National Park: Ranger Station, May, 1956, 10, Glenn Springs, May, 1956, 3 ♂, Hot Springs, July, 1948, 1 ♂; Davis Mt. Junction, July, 1948, 1 ♂; Van Horn, July, 1950, 1 ♂; Fort Davis, July, 1956, 1 ♂.

MEXICO: *Durango*: Pedricena, Aug., 1947, 19. *Zacatecas*: Fresnillo, Aug., 1947, 1 ♂.

Diplotaxis australis Vaurie

In addition to the type series from Comondu, the following specimens have been examined:

MEXICO: *Baja California* [localities listed from north to south; all dates are July, 1938, unless stated otherwise]: 25 miles south of Santa Rosalia, 12 ♂, 2 ♀; Coyote Cove, Concepcion Bay, June and July, 94 ♂, 8 ♀; Purisima, Oct., 1923, 4 ♂, 5 ♀; 20 miles north of Comondu, 103 ♂, 145 ♀; Canipole, Oct., 1941, 1 ♀; 5 miles south of San Miguel, 1 ♀; 15 miles south of San Domingo, Oct., 1941, 1 ♂, 7 ♀; 15 miles north of El Refugio, 8 ♂, 4 ♀; Venancio and San Venancio, July, 1938, Oct., 1941, 3 ♀; La Paz, Oct., 1941, and 20 miles northwest of La Paz, 24; 3 miles north of San

Pedro, 5 ♂, 2 ♀; Triunfo and 6 miles north of Triunfo, 65; 5 miles north of San Bartolo, 1 ♀; Todos Santos, Oct., 1941, 1 ♀; 8 miles northeast of Cape San Lucas, 2 ♂; 10 miles southwest of San Jose del Cabo, 2 ♂; 30 miles south of Rancho Bueno Vista [= Buena Vista in Cape region?], Aug., 1955, 1 ♂, 2 ♀.

Diplotaxis bakeri Cazier

MEXICO: *Coahuila*: Rancho de la Golondrina, Rio Sabinas, Musquiz, June 24, 1938, 1 ♀ (paratype of *bakeri*), 2 ♂; June 28, 1938, 7 ♂ (including type and paratype of *volatica* and paratypes of *bakeri*), 17 ♀ (including type and paratypes of *bakeri*); Las Ruscias, Muzquiz, July, 1938, 2 ♀ (including a paratype of *bakeri*). *Nuevo Leon*: 5 miles south of Monterrey, Sept., 1958, 3 ♂, 2 ♀; "Camp Apodaca," 19 kilometers northeast of Monterrey, May, 1958, 1 ♀.

Diplotaxis barbarae Vaurie and Cazier

MEXICO: *Chihuahua*: Santa Barbara and vicinity, 73; Huejotitlan, 32; Salas, 1 ♀. *Durango*: Durango, 6; Otinapa, 2; Encino, 7; El Tascate, 2; San Isidro, 1 ♀; San Juan del Rio, 1 ♀. *Zacatecas*: Fresnillo, 1 ♀. *Jalisco*: Guadalajara, 1 ♂; 15 kilometers south of Playa de Barrancas, 3 ♂. *Oaxaca*: Oaxaca, 650; Mitla, 1 ♀. *Puebla*: Puebla, 5; 34 miles southeast of Acatlan, 1 ♀.

Diplotaxis basalis Fall

CENTRAL UNITED STATES: (See under the species in the text).

Diplotaxis belfragei Fall

UNITED STATES: *Colorado*: La Posta; Mesa Verde, 2 ♂ (?); Redwing; San Pedro Mesa, Costilla Co.; Walsenburg. *Arizona*: Chiricahua Mts., 1 ♂; Eager, 1 ♀ (?); Vernon, 1 ♀ (?); Yuma, 1 ♂. *New Mexico*: Bent; Carlsbad; Mescalera (type of *protensa*); Mimbres R., Luna Co.; Pecos (type of var. *sinuata*); Sulphur Dam, near Jemez Springs, 1 ♂ (?); Santa Fe; Taos; Torrance Co., 1 ♀ (?); White City; White Sands; Bernalillo (?); Gallinas Park, Lincoln Co. (?). *Oklahoma*: Kenton, 3. *Texas*: Alpine; Austin; Basin, Big Bend National Park; Belton, 1 ♀; Chisos Mts., Big Bend National Park; Burnett Co.; Christoval; Dallas Co.; Davis Mts.; Davis Mt. Junction; Fort Davis; Guadalupe Pass, Hudspeth Co.; Kerrville; Madera Canyon Park, Davis Mts., 1 (or *completa*?); Memphis; Ozona; Palo Duro Canyon, Randall Co.; Pine Springs.

MEXICO: *Coahuila*: Tanque de Malone, La Babia, 1 ♂ (type of *cartwrighti*); Mesa de la Encantada, Sierra del Carmen, 1 ♀ (type of *stabilis*); Serranias del Burro, 1 ♂ (paratype of *cartwrighti*).

Nuevo Leon: Monterrey, 1 ♂; near Galeana, Aug., 1956, 1 ♀.

***Diplotaxis beyeri* Schaeffer**

UNITED STATES: *Texas*: 1 ♀; Brownsville and Esperanza Ranch, Brownsville, 10 ♂ (including lectotype), 1 ♀ (syntype); St. Thomas, Brownsville, 1 ♂, 1 ♀; Uvalde, 1 ♂; Dimmit Co., 1 ♀.

MEXICO: *Nuevo Leon*: Monterrey, 1 ♂. *Coahuila*: Las Ruscias, Muzquiz, July, 1938, 1 ♂.

***Diplotaxis bicolor* Bates**

MEXICO: *Veracruz*: Cordoba, 2 ♂. *Puebla*: Tehuacan, June, 2 ♂. *Oaxaca*: Oaxaca, July, 1 ♀; 3 miles southeast of El Tule, Apr., 5; "Prov. de Oaxaca," July, 1 ♀; Tepanistlahuaca, 1 ♂; Yolos, 2 ♀ (including the lectotype).

GUATEMALA: [No further locality]: 2 ♂; Palin, May, 1 ♂.

***Diplotaxis bidentata* LeConte**

UNITED STATES: *New Jersey*: Browns Mills; Anglesea; Allaire. *North Carolina*: Southern Pines; Maxton. *Georgia*: Leesburg; Wadlaw. *Florida*: At least 60 localities throughout the state. *Alabama*: Baldwin Co.; Daphne; Mobile; Pike Co., Spring Hill. *Mississippi*: Ocean Springs.

***Diplotaxis blanchardi* Vaurie**

UNITED STATES: *New York*: Hamilton Co. *Indiana*: Bedford; Orleans; Vincennes. *Illinois*: Carbondale; Havana; Peoria; Pittsfield; Pulaski; Rock Island. *Kentucky*: Lexington; Minorsville; Princeton; Pulaski Co. *Tennessee*: Elmwood (type). *Alabama*: Bibb Co.; Colbert Co.; Claiborne; McFarlens Hollow, Jackson Co.; Monte Sano, Madison Co.; Pt. Rock, Jackson Co.; Swain. *Louisiana*: Alexandria. *Iowa*: Ames; Mt. Pleasant. *Missouri*: Atchison Co.; Ranken; St. Charles; St. Louis. *Arkansas*: Rogers. *Nebraska*: Fort Omaha; Sioux Co. *Kansas*: Franklin Co.; Douglas Co.; Montgomery Co.; Osage Co.; Lawrence; Reno Co.; Topeka. *Oklahoma*: Murray Co.; Norman; Sulphur. *Texas*: Jeff Davis Co.

***Diplotaxis boops* Bates**

UNITED STATES: *Arizona*: Chiricahua Mts.: Painted Canyon Ranch, July, 16; Paradise, June, 1; Pinery Canyon, July, 6; Southwestern Research Station near Portal, May, July, Aug., 100; Graham Mts.: Noon Creek, 1 ♂; Huachuca Mts.: Garden Canyon, July, 13; Sunnyside Canyon, July, 8; Santa Catalina Mts.: Mud Springs, July, 1; Santa Rita Mts.: 1 ♂; Madera Canyon, June, July, 25; upper Madera Canyon, Aug., 1.

MEXICO: *Chihuahua*: Pinos Altos, 1 ♀ (type). *Durango*: Durango, 1 ♂.

***Diplotaxis brevicollis* LeConte**

CANADA: *British Columbia*: Creston; Kimberley; Marysville; Merritt; Riondel; Salmon Arm; Vancouver; Vernon; Victoria.

UNITED STATES: *Washington*: Fort Lewis; Loveland; Olympia; Puyallup; Spokane. *Oregon*: Klamath; LaPine, Lake Co.; Pringle Falls, 9 miles west of LaPine. *Idaho*: Athol; Lenore; Medimont; Moscow; Potlatch; Wardner. *Nevada*: Baker Creek, White Pine Co.; Jefferson; Nye Co.; Monitor Canyon, Nye Co. *California*: Cedarville, Modoc Co.; Walker River, Mono Co.; Willow Ranch, Warner Mts., Modoc Co. *Wyoming*: Laramie; Cumbres Pass. *Colorado*: Cascade; Colorado Springs; Estes Park; Evergreen. *Utah*: Bryce Canyon; Hatch; Fish Lake, Sevier Co.; Mt. Ellen, Henry Mts.; Navajo Lake; Provo; Red Canyon, Garfield Co.; St. George; Salt Lake City. *New Mexico*: Bent; Cloudcroft; Jemez Mts.; Luna; Pecos; Ruidoso; Torrance Co. *Texas*: Fort Davis. *Arizona*: More than 30 localities in state.

MEXICO: *Chihuahua*: Gaborachic, June, 1948, 6; Creel, Aug., 1950, 2; Ojito road to Santa Barbara, Aug., 1947, 1 ♀. *Durango*: 6 miles northeast of El Salto, Aug., 7; El Salto, 5; J. Manuel, El Salto, June, 1 ♀; Otinapa, Aug., 1947, 1 ♀; Durango, 1 ♂.

***Diplotaxis brevicornis* Cazier**

UNITED STATES: *Texas*: Valentine, July, 2; 65 miles south of Marathon, July, 1 ♂; Glenn Springs, Brewster Co., May, June, 2; Fort Davis, July, 1956, 1 ♀. *New Mexico*: Hope, July, 1 ♂; Pyramid Peak, Dona Ana Co., Aug., 4 (paratypes). *Arizona*: Chiricahua Mts., July, 1 ♂.

MEXICO: *Chihuahua*: Ojo de Lucero, 4000 ft., Aug., 1 ♂, 2 ♀; Delicias, 4150 ft., July, 1 ♂.

***Diplotaxis brevisetosa* Linell**

UNITED STATES: *Texas*: (See under the species in the text).

***Diplotaxis carbonata* LeConte**

UNITED STATES: *Colorado*: Gunnison, 2; Colorado Springs, 3; Surber, 3. *New Mexico*: Albuquerque, 8; Hot Springs, 1; Jemez Springs, 4; Las Cruces; Luna; Mesilla Park; Pyramid Peak. *Arizona*: 50 specimens from: Baboquivari Mts.; Cochise; Douglas; Bill Williams Fork; Globe; Huachuca Mts.; East Fort Lowell; Nogales; Phoenix; Patagonia; Palo Verde; Quitobaitito; Ruby; Santa Catalina Mts.; Santa Rita Mts.; Sierra Ancha Mts.; Thatcher; Tucson; White Mts.; Wickenburg. *Texas*: About 550 specimens: Boquillas; Davis Mts., Hot Springs; El Paso; Presidio.

MEXICO: *Chihuahua*: 6 miles northeast of Meoqui, Sept., 2; Balleza, July, 1; Huejotitlan, July, 3; Chihuahua, Sept., 3. *Sonora*: Alamos, July, 2; Kino Bay, July, 1; Minas Nuevas, Aug., 3; Santa Rosa Ranch, near Navojua, 1; Pitiquito, July, 7; Vinaterio, June, 1. *Sinaloa*: Mazatlan, July, 9. *Nayarit*: Ahuacatlan; Maria Madre Island, Tres Marias, May, 2; Tepic, Aug., 1. *Jalisco*: Guadaluajara, June, 1, July, 6.

Diplotaxis chiricahuae Fall

UNITED STATES: *Arizona*: Baghdad; Camp Verde; Carr Canyon, Huachucas; Chiricahua Mts.: (the type), and Pinery Canyon, Paradise, Painted Canyon, National Monument, and Southwestern Research Station; Garden Canyon, Huachuca Mts.; Globe; Madera Canyon, Santa Rita Mts.; El Mirador Ranch, Baboquivari Mts.; Miller Canyon; Nogales (a paratype); Palmerlee; Patagonia; Pinal Mts.; Ramsey Canyon, Huachuca Mts.; Sabino Canyon, Santa Catalina Mts.; San Bernardino Ranch; Santa Rita Mts.; Sycamore Forest Camp, Gila Co.; Tombstone; Tumacacori Mts.; Yanks Springs, Pajaritos Mts.

MEXICO: *Sonora*: Naco, 1 ♂; Minas Nuevas, 3 ♀; Santa Rosa Ranch, near Navojua, 1 ♂, 2 ♀; 10 miles west of Alamos, 3 ♂, 3 ♀. *Chihuahua*: Canyon de la Noria, 2; Canyon Prieto, near Primavera, 20; 49 miles southeast of Chihuahua, 8; Chihuahua, 2; Huejotitlan, 5 ♂; Matachic, 1 ♂; Primavera, 1 ♂; Salaices, 2 ♀; Santa Clara and vicinity, 8; 63 miles west of Santa Barbara, 1 ♀; Kilometer 36, Ojito road to Santa Barbara, 1 ♀. *Durango*: Rodeo San Juan, 1 ♂; 35 miles south of El Entronque, 10; Pedricena, 7.

Diplotaxis commixta Vaurie

In addition to the type series from Guerrero and Colima (see text), the following specimens have been examined:

MEXICO: *Nayarit*: Tepic, 2 ♀. *Sinaloa*: Mazatlan, 1 ♀. *Sonora*: Minas Nuevas, 1 ♀. *Nuevo Leon*: Monterrey, 1 ♂. *Hidalgo*: Pachuca, 2 ♀. *Michoacan*: Tuxpan, 2 ♂; 12 miles south of Tzitzio, 1 ♀, 3 ♀. *Oaxaca*: Tehuantepec and vicinity, 4 ♂; Salina Cruz, 1 ♂. *Chiapas*: Arriaga, 1 ♀; 10 miles west of Tuxtla Gutierrez, 5 ♂, 1 ♀.

Diplotaxis completa Cazier

UNITED STATES: *Texas*: Big Bend National Park, Brewster Co.: The Basin, 3000–4000 ft., 2 ♂, 1 ♀; Chisos Mts., 2 ♂; Juniper Canyon, Chisos Mts., 2 ♂, 2 ♀; Crockett Co.: Ozona, 1 ♀.

MEXICO: *Coahuila*: Serranias del Burro, 1 ♂ (type). *Durango*: El Tascate, 26 ♂, 24 ♀; Nombre de Dios, 16 ♂, 3 ♀; Santa Maria del Oro, 1 ♂. *Zacatecas*: Zacatecas, 6 ♀. *Chihuahua*: Prima-

vera, 1 ♂; Huejotitlan and vicinity, 2 ♂, 7 ♀; Santa Barbara, 2 ♂, 1 ♀.

Diplotaxis conformis Fall

UNITED STATES: *Oregon*: Lakeview, 1. *Nevada*: 10 miles east of Panaca, 3; Lee Canyon, Las Vegas, 1. *California*: Keystone Canyon, New York Mts., San Bernardino Co., 2; Ivanpah, 2. *Colorado*: Fort Collins, 1; Mesa Verde National Park, 2. *Utah*: Bellevue, 3; San Juan Co., 1; Trout Creek, Ibapah Mts., 1. *Arizona*: Apache Co., 1; Carrizo, 1; Flagstaff, 2; Geronimo, 1; Globe, 1; Grand Canyon, 3; Navajo, 2; Noon Creek, Graham Mts., 1; Pinal Mts., 4; Pine, 1; Sedona, 1; Sierra Ancha, 1; Sycamore Forest Camp, north of Payson, 99; Walnut, 1; White Mts., 5; Wide Ruin, north of Chambers, 12. *New Mexico*: Albuquerque, 1; Cedro Canyon, Bernalillo Co., 2; Cienega Canyon, Sandia Mts., Bernalillo Co., 8; Edgewood, 1; Grants, 2; Jemez Springs and vicinity, 25; Mt. Taylor, Valencia Co., 2; Rio Arriba Co., 1; Rowe, 1; Silver City, 6.

Diplotaxis confusa Fall

MEXICO: *Baja California*: Santa Rosa 2 ♂ (including the type); Triunfo and vicinity, July, 5; Todos Santos, Oct., 1 ♂; La Paz, July, 2; San Bartolo, July, 3; Santiago, July, 1; San Miguel, July, 6; Agua Caliente, Cape region, Oct., 38; Comondu, July, 81; San Domingo, July, 69; El Refugio, July, 43; San Ignacio and vicinity, July, Sept., 73; 14 miles south of El Arco Mines, June, 3; Mesquital, June, 6; Punta Prieta, June, 19; Chapala Dry Lake, Aug., 3; San Fernando, July, 38; 10 miles south of Catavina, July, 5; Palmarita [not located], Oct., 2. (The above localities are from 1938 or 1941).

Diplotaxis connata Schaeffer

UNITED STATES: *Arizona*: (See under the species in the text).

Diplotaxis consentanea Bates

MEXICO: *Hidalgo*: Zacualtipan, 1 ♂; San Miguel, 4; El Chico, Pachuca, 1. *Puebla*: Puebla, 1 ♂; San Juan de los Llanos, 1 ♀. *Veracruz*: Orizaba, 1 ♂ (lectotype); Jalapa. *Distrito Federal*: Pedregal; Los Reyes, 2 miles southeast of Mexico City, 2 ♂, 1 ♀. *Mexico*: Real de Arriba, 1; Temascaltepec, 3 ♂, 3 ♀; Amecameca, 4; Volcan de Mexico, 1 ♀. *Michoacan*: Uruapan, 6; 25 kilometers east of Morelia, 70; 2 miles south of Corupo, 1 ♂. *Aguascalientes*: Aguascalientes, 21. *Jalisco*: Mazamitla, 1 ♂ [label has Michoacan instead of Jalisco, which is an error]. *Guerrero*: Omilteme, 6. *Colima*: Vulkan Colima, Esperanza, 1 ♂. *Oaxaca*: Peras, 1 ♂; Oaxaca, 1 ♀.

***Diplotaxis convexilabrum* Vaurie and Cazier**

MEXICO: *Durango*: Durango, 3 ♂, 1 ♀ (paratypes); Nombre de Dios, 20 (including type and paratypes); Aug., 1951, 1 ♂; Otinapa, 1 ♀ (paratype). *Zacatecas*: 15 kilometers east of Sombrerete, July, 1951, 3 ♂. *Aguascalientes*: Aguascalientes, 2 ♀ (paratypes); June, 1952, 2 ♀; Pabellon, June, 1956, 1 ♂. *Jalisco*: Guadalajara, July, 1955, 1 ♀. *Guanajuato*: Guanajuato, 1 ♀.

***Diplotaxis corvina* LeConte**

UNITED STATES: *California*: "Fort Yuma," 1 ♂ (type); Ripley, Riverside Co., Oct., 1 ♀; Holtville, June, 1. *Arizona*: Ehrenberg, July, 2 ♂, 3 ♀; Yuma, 1 ♂, 1 ♀; Laguna, 1 ♂.

MEXICO: *Sonora*: 25 miles south of San Luis, June, 1 ♀.

***Diplotaxis cribraticollis* Blanchard**

MEXICO: *Distrito Federal*: Tlalpam, 1 ♀; Chapultepec, 1 ♂; Tejupilco, 1 ♀; Mexico City, 1 ♂; Tacubaya, 1 ♀; Pedregal, 40. *Mexico*: Temascaltepec, 7. *Michoacan*: Tuxpan, 10; Uruapan, 1; 3.5 miles northwest of Tzitzio, 3; 25 kilometers east of Morelia, 103; south side of Lake Cuitzeo, 4. *Guerrero*: Chilpancingo, 1; Teloloapan, 3; Taxco, 1 ♂. *Colima*: "Vulkan Colima," 1 ♂, 1 ♀. *Jalisco*: Matanzas, 3.

***Diplotaxis cribriceps* Bates**

MEXICO: *Colima*: Colima, 4. *Guerrero*: El Mogote, near Taxco, 5000 ft., June, 1954, 14; Taxco, Sept., 1942, 1, June, 1 ♂, 1 ♀; Teloloapan, June, 2. *Morelos*: Cuernavaca, 13; Jujutla, June, 1929, 1 ♀; Alpuyeca, June, 1951, 5; Amacuzac, June, 3. *Oaxaca*: Tepetlapa, 3000 ft., Oct., 1 ♂ (type).

***Diplotaxis curvaticeps* Fall**

UNITED STATES: *Texas*: Hidalgo Co.: Oct., 3, San Juan, 2; Progreso, 2, Bentsen State Park, Mission, Sept., 1 ♀; Cameron Co.: Brownsville, 12 (including the type), Harlingen, 1 ♂.

MEXICO: *Nuevo Leon*: El Diente; Apodaca and vicinity of Monterrey, 31; General Bravo, 1; C. de Caballo [not located], 1. *Tamaulipas*: Abasolo, 2; Victoria, 155; 29 kilometers south of Hidalgo, 1 ♂; Villagran, 8. *San Luis Potosi*: Valles, 24. *Guanajuato*: Celayo, Dec., 1. *Hidalgo*: Pachuca, July, 1 ♀.

***Diplotaxis dahlia* Cazier**

UNITED STATES: *California*: (See under the species in the text).

***Diplotaxis denigrata* Bates**

MEXICO: *Michoacan*: 12 miles south of Tzitzio,

1 ♂, 1 ♀. *Morelos*: Cuernavaca, 1 ♂. *Veracruz*: Lake Catemaco, 26; Orizaba, 1 ♂; Veracruz, 2 ♀. *Oaxaca*: Tehuantepec, 10; 10 miles northeast of Juchitan, 5; Tepetlapa, 1; 42 miles southeast of Oaxaca, 9. *Puebla*: 11 miles southeast of Acatlan, 1 ♂, 2 ♀; east of Petlalcingo, 1 ♂. *Chiapas*: Tuxtla Gutierrez and vicinity, 232; 8 miles northeast of Cintalapa, 1 ♂; Chiapa, March, about 300. *Campeche*: Campeche, 4. *Quintana Roo*: Cozumel, 1 ♀, Xcan Nuevo, 10. *Yucatan*: Temax, 1 ♂ (lectotype), 4 ♀; Chichen Itza, May, 55; Chuminopolis, 8; Candelaria Mayapan, 1 ♀; Pisté, 791. Uxmal, 161.

EL SALVADOR: Volcan Conchagua, 1 ♂.

HONDURAS: *Yoro*: 12 kilometers west of Olanchito, 1 ♂, 3 ♀; *Morazan*: Zamorano, 5.

COSTA RICA: *Puntarenas*: Dominical, 1 ♂.

***Diplotaxis dentella* Fall**

UNITED STATES: *Arizona*: Benson; Bloody Basin, Yavapai Co.; Browns Canyon, Baboquivari Mts.; Canelo; Chino Valley; Chiricahua Mts.; Cochise Stronghold, Dragoon Mts.; Flagstaff; Geronimo; Globe; Granville; Hualpai Mts., Mohave Co.; Miami; Molina Basin, Santa Catalina Mts.; Oak Creek Canyon, Coconino Co.; Oracle; Painted Canyon Ranch, Chiricahua Mts.; Paradise; Patagonia; Pinal Mts.; Pinery Canyon, Chiricahua Mts.; Portal; Prescott; Rincon Mts.; Sabino Basin, Santa Catalina Mts.; Sedona; Sierra Ancha Mts.; Sycamore Forest Camp, north of Payson; Verde Hot Springs, Yavapai Co. *New Mexico*: Tyrone, 1 ♀.

MEXICO: *Sonora*: Naco, Aug., 1949, 1 ♀.

***Diplotaxis denticeps* Bates**

UNITED STATES: *Texas*: El Paso, 1 ♂.

MEXICO: *Chihuahua*: Delicias and vicinity, 800; Catarinas, 500; Camargo and vicinity, 900; Matachic, 3; 6 miles northeast of Meoqui, 28; 15 miles east of Parral, 3; San Pedro River, 39 miles southeast of Chihuahua, 38; Primavera, 1 ♀. *Durango*: San Juan del Rio, 70; El Salto, 3; Durango, 6; Palos Colorados, 1 ♂. *Zacatecas*: Zacatecas, Aug., 1 ♀. *Aguascalientes*: Aguascalientes, 100. *Jalisco*: Matanzas, 100; 5 kilometers west of Lagos, 22. *Mexico*: Chapingo, 10; Toluca, 4 (including the lectotype); Salazar, 1 ♂; Teotihuacan Pyramid, 2. *Hidalgo*: Pachuca, 1; Zimapan, 1 ♂. *Distrito Federal*: Mexico City, Mar., 4. *San Luis Potosi*: San Luis Potosi and vicinity, 72. *Oaxaca*: Oaxaca, 60.

***Diplotaxis deserta* Fall**

UNITED STATES: *Arizona*, *Utah*, *California*: (See under the species in the text).

***Diplotaxis dubia* LeConte**

UNITED STATES: *Texas*: (See under the species in the text).

***Diplotaxis errans* Fall**

UNITED STATES: *Texas*: (See under the species in the text).

***Diplotaxis exstans* Vaurie**

In addition to the type material from Chihuahua, Jalisco, and Oaxaca given in the text, the following specimens have been examined:

MEXICO: *Chihuahua*: Catarinas, July 25, 1947, 29 ♀; 2 miles west of Matachic, 6400 ft., July 7, 1947, 1 ♂, 3 ♀. *Durango*: Palos Colorados, 8000 ft., Aug. 5, 1947, 1 ♂; Encino, 6200 ft., July 27, 1947, 2 ♂, 4 ♀. *Oaxaca*: 1 ♂; Peras, 1 ♂; 63 miles west of Tehuantepec, July 21, 1952 (E. E. Gilbert, C. D. MacNeill), 2 ♂, 2 ♀; Miahuatlan, June 30, 1956 (B. Rotger), 1 ♂.

***Diplotaxis fimbriata* Fall**

UNITED STATES: *California*: Riverside Co.: Banning, 1; Blythe, 5; Hopkins Well, 10; Mecca, 3; Painted Canyon, 35; Palm Springs, 3 (including type of *fimbriata*); White Water, 1. San Bernardino Co.: Cedar Canyon, Providence Mts., 6 ♂ (including the type of *arta*), 4 ♀; Cronise Valley, 34; Freda, 5; Morongo Valley, 1; Needles, 2; Quail Spring, Joshua Tree National Monument, 360; Victorville, 46; Yermo, 1. San Diego Co.: Anza State Park, 1; Borego, 30.

MEXICO: *Baja California*: San Felipe, June, Oct., 23 ♂, 2 ♀.

***Diplotaxis frondicola* Say**

UNITED STATES: *New Jersey*. *Pennsylvania*: Arendtsville, 1; Downingtown, 2. *Maryland*: Baltimore, 3. *Virginia*: Harrisonburg, 1; Fort Monroe, 1. *North Carolina*: Chapel Hill, 5. *South Carolina*: 1 (type of *testacea*). *Florida*: Tallahassee, 4. *Alabama*: Florence, 2. *Mississippi*: About 60 specimens from throughout the state. *Louisiana*: Leesville, 4. *Texas*: Many from following counties: Bexar, Brazos, Brewster, Brown, Burnet, Comal, Dallas, DeWitt, Edwards, Gillespie, Gonzales, Harris, Kendall, Kerr, Lee, Matagorda, Menard, Polk, Smith, Sutton, Tom Green, Val Verde. *Ohio*: Clifton, 2; Ross Co., 1. *Indiana*: Orleans, 8; Bedford; Lawrence Co., 1. *Illinois*: Many localities. *Kentucky*: Cane Valley; Columbia; Louisville; Princeton. *Tennessee*: Clarksville; Knoxville. *Missouri*: Osage Hills; 1; Ranken, 1. *Arkansas*: Franklin Co., 1; Hempstead Co., 1; Marion Co., 1; Washington Co. *Oklahoma*: Norman, 2; Wichita National Forest, 4. *Kansas*: Douglas Co.,; Elk City; Galena; Leavenworth; Onaga. *Nebraska*: West Point, 2.

***Diplotaxis fulva* LeConte**

UNITED STATES: *New York*: 2 ♂ (including the type); 1 ♀; West Farms, 1 ♂. *New Jersey*: Hopatcong, 1 ♀; Snake Hill, May, 1889, 1 ♂; South Orange, Apr., 1889, 1 ♂; Englewood Cliffs, June, 1 ♀. *Pennsylvania*: Allegheny Co., 1 ♂. *Maryland*: Baltimore, 1 ♂, 1 ♀. *Ohio*: Shawnee Forest, June, 1941, 12 ♂, 6 ♀; Delaware Co., June, 3 ♂; Meigs Co., June, 5 ♂, 1 ♀; Franklin Co., June, 1 ♂; Licking Co., May, July, 2 ♂, 1 ♀; Jackson Co., May, 1 ♂. *Illinois*: Pulaski, 1 ♂. *Alabama*: Monte Sano, Madison Co., June, 1931, 5 ♂; Squaw Shoals, Warrior River, Apr., 1 ♂.

***Diplotaxis harperi* Blanchard**

Specimens have been examined from every state east of the Mississippi River except Maine, New Hampshire, Vermont, Connecticut, Rhode Island, Maryland, Delaware, Virginia, West Virginia, and Mississippi. West of the Mississippi River, the following localities are represented: *Minnesota*: Minneapolis; Lake Minnetonka. *Iowa*: Ames; Decorah; Iowa City; McGregor. *Missouri*: Goodman; Hendrickson; Osage Beach; Ozark Mts.; Platte Co.; Rolla; St. Louis; Valley Park; Willard. *Arkansas*: Many localities. *Oklahoma*: Latimer Co.; Sequoyah Co.; Rich Mt. *Texas*: Maud, Bowie Co. *Kansas*: Argentine; Atchison Co.; Elk City; Galena; Leavenworth; Mt. Hope; Muncie; Onaga; Tonganoxie; Wyandotte Co.

***Diplotaxis haydenii* LeConte**

UNITED STATES: *North Dakota*: Williston. *Nebraska*: Yellowstone River (syntypes of *haydenii*); Mitchell; Valentine; Sioux Co. *Kansas*: 1 ♀ (type of *innoxia*). *Texas*: Canadian. *Colorado*: Costilla Co.; Durango; Fort Collins; Pagosa Junction; Pueblo; Walsenberg; Webster. *Wyoming*: Cheyenne; Douglas; Lance Creek; Laramie; Lusk; Orin Junction; Pine Bluffs; Wheatland; Yellowstone Park. *Montana*: Cartersville; Miles City. *Idaho*: American Falls Power Co.; Malta; Pocatello. *Nevada*: Ely; Goldfield; Mt. Wheeler; Panaca; Reno; White Pine Co. *Utah*: Eureka; Juab Co.; Logan; Monticello; Nevada Lake; Stockton (type of *levicoxa*); Salt Lake City; Verdure. *California*: Chilcoot, Plumas Co.; Lassen Co.; Peavine, Sierra Co.; Cedarville (type and 26 paratypes of *impressifrons*); Dorris, Siskiyou Co. *Arizona*: Carrizo; Flagstaff; Geronimo; Grand Canyon; Jerome; Lake Mary; Pine; Rose Peak; St. Johns; Sierra Ancha Mts.; Tucson; Vernon; White Mts.; Williams. *New Mexico*: Bent; Gallup; Hot Springs; La Jara; Mescalera Reservation; Otero; Santa Fe; Taos; Sulphur Dam, Sandoval Co.; Torrance Co.; Tusas.

MEXICO: *Chihuahua*: Ojo de Lucero, Aug., 1953, 1 ♀.

***Diplotaxis iguala* Vaurie**

In addition to the type series from "Guerrero," and Iguala, Guerrero, the following specimens have been examined:

MEXICO: *Guerrero*: Mexcala, 1 ♂; Amula, 1 ♂, 1 ♀; Chilpancingo, 2 ♂; Iguala, July 17, 1957 (Selanders), 7; Cocula, 3. *Oaxaca*: Tepetlapa, 2 [given on label as Guerrero, but is in Oaxaca]. *Morelos*: Puente de Ixtla, July, 1900 (C. C. Deam), 1 ♀, Aug. 14, 1953 (R. B. and J. M. Selander), 1 ♀; 18 miles southeast of Cuernavaca, Aug. 10, 1955 (R. B. and J. M. Selander), 8; Yautepec, 1 ♀; Jojutla, 3.

***Diplotaxis incuria* Fall**

UNITED STATES: *Nevada*: (See under the species in the text).

***Diplotaxis ingenua* Fall**

UNITED STATES: *Arizona*: Bagdad; Browns Canyon, Baboquivari Mts.; Camp Verde; Carr Canyon, Huachuca Mts.; Chiricahua Mts.; Globe; Huachuca Mts.; Kits Peak, Baboquivari Mts.; Madera Canyon, Santa Rita Mts.; Miller Canyon; Nogales; Painted Canyon, Paradise, and Southwestern Research Station, Chiricahua Mts.; Palmerlee; Patagonia; Pinal Mts.; Ruby; Sabino Canyon, Santa Catalina Mts.; Santa Rita Mts.; Sierra Ancha Mts.; Tucson; Tumacacori Mts.; upper Madera Canyon, Santa Rita Mts.; Yanks Springs, Pajaritos Mts.

MEXICO: *Sonora*: Naco, Aug., 1949, 3; Rio Mayo, July, 2. *Chihuahua*: Catarinas, July, 1947, 11; Canyon de la Noria, near Parrita, Aug., 1952, 1 ♂, 1 ♀; Huejotitlan and vicinity, July, 1947, 64; Matachic, July, 1947, 1 ♂. *Durango*: Encino, July, 1947, 19.

***Diplotaxis insignis* LeConte**

UNITED STATES: *Utah*: Salt Lake Desert, 1 ♂ (type of *insignis*); Salt Lake City, 1 ♀; Stockton, 1 ♀; St. George, 1 ♂. *Idaho*: Blackfoot, 1 ♀. *Nevada*: Mt. Wheeler, 1 ♀; Monitor Canyon, Nye Co., 1 ♀. *California*: Blancos Corral, White Mts., Mono Co., 17; Camp Baldy and Clear Creek Camp, Los Angeles Co., 5; Coalinga, 17; Colville, 12; Colorado Desert, San Bernardino Co., 1 ♂; Desert Spring, 1 ♂; Jacumba, 6; Mendocino Co., 2 ♀; Panamint Mts., Inyo Co., 10; Pinon Flat, San Jacinto Mts., Riverside Co., 1; Rock Creek, Inyo Co., 1; Rogers Peak, Panamint Mts., 1 ♂; Telsa Canyon, Summit, Alameda Co., 11.

***Diplotaxis languida* LeConte**

UNITED STATES: *Georgia*: Billy's Is., Okefenokee Swamp, 4; Spring Creek, Decatur Co., 3. *Florida*: Alachua Co., 2; Allandale, 1; Arcadia, 1; Braden-

ton, Mar., 3; Coronado Beach, 1; DeLand, Mar., 1; Eau Gallie, 1; Edgewater, 4; Enterprise, 1; Gainesville, 42; Kissimmee, 1; Lakeland, 4; Melbourne, Mar., 33; Micanopy, 8; New Smyrna, 1; Polk Co., 2; Port Sewall, Mar., 1; St. Augustine, 1; Tampa, Mar., 1; Welaka, 1.

***Diplotaxis lengii* Fall**

UNITED STATES: *Louisiana*: 1 ♂, 1 ♀; Leesville, May, 2; Ruston, 1 ♀; Vowells Mill, 4 (including the type). *Texas*: Longview, 1 (paratype); Robertson Co., 2; Brazos Co., Apr., 1 ♂; Wiergate, Mar., 1 ♀; Fred, 2 ♂, 2 ♀; Smith Co., May, 2 ♂; Tyler, 1 ♀. *Oklahoma*: Atoka Co., 1 (paratype); South McAlester, 1 (paratype); Sapulpa, 2. *Kansas*: Elk City, 2 ♂. *Arkansas*: 1 ♂; Hope, 9; Washington Co., 1 ♀; Drew Co., 10; Clark Co., 1 ♂, 1 ♀.

***Diplotaxis levicosta* Fall**

UNITED STATES: *New Mexico*: Albuquerque, 1 ♂ (type); Hope, 1 ♀; White Sands, 1 ♀. *Texas*: Valentine, Jeff Davis Co., 1 ♀; 9 miles southwest of Dell City, Hudspeth Co., 5; Basin, Big Bend National Park, Brewster Co., 2; Culberson Co., 1 ♀.

MEXICO: *Chihuahua*: 20 miles south of Juarez, 1 ♂; Torreon, 1.

***Diplotaxis liberta* Germar**

UNITED STATES: *Massachusetts*: Dorchester, 1; Norwell, 1; Melrose, 1. *Connecticut*: Putnam, 3. *New York*: Bear Mt., 4; Cold Spring Harbor, 1; New Rochelle, 1; Waverly, 1. *New Jersey*: Angelsea, 2; Lavalette, 2; Woodbury, 3. *District of Columbia*: 2. *Maryland*: Suitland, 1. *West Virginia*: White Sulphur, 1. *Virginia*: Camp Peary, 2; Camp Pickett, 2; Hampton, 3; Ocaquam, 1; Petersburg, 16; Quantico, 1. *North Carolina*: Brevard, 1; Chapel Hill, 8; Graham Co., 2; New River, 3; Raleigh, 1; Southern Pines, 1. *South Carolina*: Clemson College, 1; Jocassee, 1; Lexington, 2; Six Mile, 1. *Georgia*: Clayton, 1; Morgan Co., 4; Russells, 1; Sylvania, 1; Thomasville, 1. *Florida*: Suwannee River, 1. *Alabama*: Auburn, 1; Barton, 1; Birmingham, 1; Cleburne Co., 41; DeSoto State Park, 3; Grand Bay, 3; Jefferson Co., 1; Langdale, 1; Lock, 14; Tuscaloosa Co., 1; Mobile, 3; Seddon, 2; Tuscaloosa, 1. *Mississippi*: Lucedale, 6; Newton, 1; Orange Grove, 1; Rich-ton, 1. *Louisiana*: Covington, 1; Hammond, 1. *Tennessee*: Burrville, 22. *Ohio*: Hocking Co., 3; Scioto Co., 1; Shawnee Forest, 1.

***Diplotaxis macronycha* Fall**

UNITED STATES: *Arizona* and *New Mexico*: (See under the species in the text).

Diplotaxis macrotarsus Vaurie

In addition to the type from Variedades, Guatemala, the following specimens have been seen:

MEXICO: Paratypes: [No further locality], 1 ♂. *Chiapas*: 1.5 miles northeast of Los Amates, Mar. 17, 1954, 2600 ft., at light (R. K. Selander), 1 ♀. *Oaxaca*: "Province of Oaxaca," 1860 (A. Sallé), 1 ♂, 3 ♀. Not paratypes: *Oaxaca*: Tehuantepec, June 18, 1957, at light (David Lauck), 2 ♀.

GUATEMALA: Paratypes: *Suchitepequez*: Variedades, June 30, July 3, 1947 (P. and C. Vaurie), 6 ♀; Moca, June 23, 1947, 3000 ft. (C. and P. Vaurie), 1 ♂. *Escuintla*: Palin, May, 1924 (W. M. Mann), 1 ♂, 1 ♀; Tiquisate, May, 1956, at light (T. H. Hubbell), 2 ♂. *Guatemala*: 71 miles east of Guatemala City, May, 1947 (R. R. Miller), 1 ♀.

EL SALVADOR: Not paratypes: *San Salvador*: San Salvador, May 1, 1957 (P. A. Berry), 3 ♀, May, June, 1958 (O. L. Cartwright), 9 ♂, 14 ♀. *La Union*: Volcan Conchagua, May, 1958 (O. L. Cartwright), 1 ♀.

Diplotaxis magna Bates

UNITED STATES: *California*: Walker River, Mono Co., 1 ♀. *Utah*: Bryce Canyon, 2; Navajo Lake; Red Canyon, near Panguitch, 2. *Colorado*: Mesa Verde, 2. *New Mexico*: Grants, 8; Gallinas Park, Lincoln Co., 1; Mt. Taylor, Valencia Co., 1; Mt. Withington, Magdalena, 1; Jemez Springs, 1; Simpson's Ranch, near LaJara, 3; Red River Village, 3; Sulphur Dam, near Jemez Springs, 2. *Arizona*: (About 150 specimens). Ashfork; Bear Wallow, Santa Catalina Mts.; Camp Verde; Carr and upper Carr canyons, Huachuca Mts.; Chiricahua Mts.; Flagstaff; Geronimo; Greer; Grand Canyon; Heber; Huachuca Mts.; Kehl Spring Camp; Madera Canyon, Santa Rita Mts.; McNary; Middle Pioneer Camp, Pinal Mts.; Mt. Graham; Mt. Lemmon; Oak Creek; Paradise; Phoenix; Pine; Pinecrest, Graham Mt.; Pinery Canyon and Rustlers Camp, Chiricahua Mts.; Portal; Prescott; Rose Peak; San Francisco Mts.; Santa Catalina Mts.; Santa Rita Mts.; Senator; Summerhaven, Santa Catalina Mts.; Sierra Ancha Mts.; Wet Canyon and Arcadia Camp, Graham Mts.; Williams, 1 ♀ (type of *costulata*).

MEXICO: 2 ♂ (including type of *impressicollis*); *Chihuahua*: Gaborachic, 8000 ft., June, 1948, 1 ♂, 1 ♀; 30 miles west of Balleza, 7900 ft., May, 1948, 1 ♀. *Durango*: Durango, 8000 ft., 1 ♂ (type of *magna*), 1 ♀; El Salto, 9300 ft., June, 3 ♂, 1 ♀.

Diplotaxis marginicollis Fall

UNITED STATES: *Arizona*: Camp Verde; Carr Canyon, Huachuca Mts.; Chiricahua Mts.; Garden Canyon, Huachuca Mts.; Globe; Huachuca Mts.; Madera Canyon, Santa Rita Mts.; Middle Pioneer Camp, Pinal Mts., Miller Canyon, Pal-

merlee; Mt. Washington, Nogales; Oracle; Palmerlee; Phoenix; Pinal Mts.; Ruby; Sabino Canyon, Santa Catalina Mts.; Santa Rita Mts.; Sierra Ancha Mts.; Tumacacori Mts.; White Mts.; Willcox; Yanks Spring, near Ruby, Pajaritos Mts. *New Mexico*: Jemez Springs; Rodeo; Silver City. *Texas*: 20 miles north of Hondo, Medina Co., 1 ♀ (see range of species in text). *Kansas*: Douglas Co., July, 1 ♀ (see range of species in text).

MEXICO: *Chihuahua*: Canyon Prieto, near Primavera, July, 1947, 1 ♂, 1 ♀.

Diplotaxis maura Fall

UNITED STATES: *New Mexico*: Roswell, 1 ♀. *Texas*: Alpine, Brewster Co., 4; Austin, Travis Co., 8; Brownwood, Brown Co., 2; Christoval, Tom Green Co., 6; Del Rio, Val Verde Co., 2; El Paso, El Paso Co., 20; Fort Sam Houston, Bexar Co., 6; Harlingen, Cameron Co., 3; Kerrville, Kerr Co., 3 ♂, 5 ♀; New Braunfels, Comal Co., 3; San Antonio, Bexar Co., 2; Val Verde County, 3 ♀.

MEXICO: *Tamaulipas*: Villagran, June, 1951, 1 ♀.

Diplotaxis megapleura Vaurie

In addition to the type series from Tepic, the following specimens have been examined:

MEXICO: *Sonora*: Minas Nuevas, Aug., 1 ♀; Alamos, July, 1 ♂. *Sinaloa*: Culiacan, July, 1 ♂, 2 ♀. *Nayarit*: Tepic, July, Aug., 26; San Blas, Apr., 2; Compostela, July, 2 ♂. *Durango*: J. Manuel, El Salto, June, 64; San Antonio, El Salto, 20; San Antonio, 2; Nombre de Dios, Aug., 10. *Guerrero*: El Mogote, near Taxco, June, 132; Chilpancingo, July, 1 ♂. *Michoacan*: Tuxpan, July, 5 ♂, 7 ♀; 12 miles south of Tzitzio, 19° 20' N., 100° 50' W., 1 ♂, 5 ♀. *Morelos*: Cuernavaca, 4 ♂, 2 ♀. *Puebla*: Matamoros, 1 ♂; 34 miles southeast of Acatlan, July, 3 ♂; east of Petlalcingo, June, 4; 6 miles south of Atlixco, May, 3 ♂, 2 ♀. *Oaxaca*: Oaxaca, July, about 165; Huahuapan de Leon, July, 9; 10 miles northeast of Juchitan, Apr., 6 ♀. *Chiapas*: Near Rio San Gregorio, July, 1 ♂.

Diplotaxis mentalis Fall

UNITED STATES: *Colorado*: Gardner, 1. *Utah*: Moab, 1; Navajo Lake, 1; Oak Creek Canyon, San Juan Co., 1. *Arizona*: Chiricahua Mts., 2; Garden Canyon, Huachuca Mts., 26; Rincon Mts., 1; Santa Rita Mts., 1; Southwestern Research Station, near Portal, 1. *New Mexico*: Bent, 2; Gallinas Park, Lincoln Co., 1; Jemez Springs, 3; Lincoln Co., 2; Mescalera Reservation, 8; Santa Fe, 1 (paratype); Santa Fe Co., 11; Sulphur Dam, near Jemez Springs, 5; Villanueva, 2. *Texas*: Abilene, 1; Austin, 1; Basin and Chisos Mts., Big

Bend National Park, 27; Christoval, 2; Colorado City, 1; Dallas Co., 4; Davis Mts., 1; Fort Davis, 1; Kerrville, 15; Llano, 1; New Braunfels, 1; Ozona, 1; Pine Springs, 1; Rio Frio, 1; Rocky Springs, 1; Sabinal, 1; Sheffield, 5, Val Verde Co., 1.

MEXICO: *Chihuahua*: Santa Barbara, July, 1947, 1 ♀.

Diplotaxis misella Fall

UNITED STATES: *Arizona*: Cochise Co., 1 ♂ (type); Coyote Mts., 1; Florence, July, 3; Goldfield, Pinal Co., Aug., 4; Liberty, Sept., 1; Madera Canyon, Rincon Mts., Aug., 2; Magna, Aug., 2; Marinette, Aug., 4; Sabino Canyon, Santa Catalina Mts., July, Aug., 2; Santa Cruz Village, Cobabi Mts., Aug., 8; Tucson, June, July, Aug., 10; Wickenburg, Aug., 3; Yuma Co., Tinajas Altas Mts., Aug., 2.

MEXICO: *Chihuahua*: 20, 25, and 42 miles southwest of Camargo, July 13 to 15, 120; 6 miles northeast of Meoqui, Sept. 2, 1950, 2; 49 miles southeast of Chihuahua, San Pedro River, July 20, 1952, 4000 ft., 43. *Sonora*: La Cienaga, Aug. 6, 1950, 1 ♂, 2 ♀.

Diplotaxis missionaria Vaurie

In addition to the type series from San Ignacio, the following specimens have been examined:

UNITED STATES: *California*: Jacumba, June, 1940, 1 ♂; Mt. Spring, July, 1938, 1 ♀; Santa Rosa Mts., 2 ♂, 1 ♀.

MEXICO: *Baja California*: [localities listed from north to south]: San Felipe, June, 1952, Oct., 1953, 1 ♂, 2 ♀; San Fernando, July, 1938, 1 ♂; 10 miles south of Catavina, July, 1938, 15; Angeles Bay, June, 1921, and 8 miles northwest of Los Angeles Bay, June, 1952, 3 ♀; 15 miles north of Punta Prieta, July, 1938, 1 ♀; 14 miles south of El Arco Mine, June, 1938, 1 ♂, 2 ♀; 15, 45, and 50 miles north of San Ignacio, June, July, 1938, 235.

Diplotaxis mistura Vaurie

In addition to the type and paratypes from El Salvador, the following specimens have been examined:

MEXICO: *Chiapas*: Las Cruces (15 miles west), July 27, 1952 (E. E. Gilbert, C. D. MacNeil), 1 ♀; Pacific slope cordillera, 800–1000 meters (L. Hotzen), 1919, 1 ♀. *Oaxaca*: Tehuantepec, June 24, 1955 (R. B. and J. M. Selander), 1 ♂, July 12, 1955 (P. and C. Vaurie), 1 ♂; 30 kilometers east of Tehuantepec, May 26, 1951, 2 ♀; Almoloya [no date] (Frederick Knab), 6 ♂, 10 ♀. *Veracruz*: Playa Vicente (Sallé collection), 1 ♂, 1 ♀; Jalapa (Hoegel), 1 ♂.

EL SALVADOR: *La Union*: Volcan Conchagua, May 27–29, 1958 (O. L. Cartwright), 1 ♀.

HONDURAS: Lombardia [not located] (W. M. Mann), 1 ♂.

Diplotaxis muricata Schaeffer

UNITED STATES: *Arizona*: Chiricahua Mts., 1 ♂; Hereford, 1; Douglas, 1 ♀. *New Mexico*: Hope, 1 ♂; Deming, 2 (type and paratype of *hispida*); Albuquerque, 2 (including a paratype of *hispida*); White City, 17; Carlsbad, 1 ♂; Pyramid Peak, 2 ♂, 3 ♀; Filmore Canyon, Organ Mts., 1 ♂. *Texas*: Alpine, 7 (including type of *muricata*); Marga, 2; Big Springs, 3; Dalhart, 1 ♂; Del Rio, 6; 9 miles southwest of Dell City, 1 ♀; Davis Mts., 1 ♂; Fort Stockton, 1 ♀; Jeff Davis Co., 1 ♂; Lake Walk, 7; Marathon, 30; Sheffield, 1 ♀; Shumla, 1 ♀; Sierra Blanca, 12; Sanderson, 1 ♂, 5 ♀; Van Horn, 1 ♂, 3 ♀; Val Verde Co., 42; Glenn Spring, 1 ♀; Fort Davis, 1.

MEXICO: *Nuevo Leon*: Montemorelos, May, 1937, 1 ♀. *Coahuila*: La Gloria, south of Monclova, Aug., 1947, 2 ♂, 1 ♀; Saltillo and vicinity, Aug., 1947, May, 1952, 6 ♂, 5 ♀; Cabos, Aug., 1947, 1 ♀. *Chihuahua*: Parral and vicinity, July, 1947, 12; Primavera, June, 1947, 3 ♀; Camargo and vicinity, July, 1947, 18; Las Delicias, July, 1947, 1 ♂, 2 ♀. *Durango*: San Juan del Rio, July, 1947, 103.

Diplotaxis obscura LeConte

CANADA: *Saskatchewan*. *British Columbia*: Ashcroft; Crown Lake; Iron Mask, Kamloops; Vernon. *Alberta*: Calgary; Edmonton; Medicine Hat.

UNITED STATES: *Washington*: 2; Spokane, 1. *Oregon*: China Hat; Kamela; La Grand; La Pine and vicinity; Union Creek, Jackson Co.; Klamath Co.; Pringle Falls. *Idaho*: Genesee; Montpelier; Pocatello. *Montana*: Western Montana, 1. *California*: Boca; Dardanelle; Hope Valley, Alpine Co.; Inyo Co.; Lake Tahoe, Eldorado Co.; Myers; Shasta Co.; Sonora Pass, Lassen Co. *Wyoming*: Carbon Co. *Colorado*: Allens' Park; American Flats; Cheyenne Mts.; Conejos Co.; Durango; Florissant; Fort Collins; Gardner; Golden; Gunnison; Hermosa, La Plata Co.; Huerfano Co.; Loveland; Maybell; Mesa Verde; Montrose; Steamboat Spring. *Utah*: 1 ♀ (type of *compacta*); Bryce Canyon; Manila; Pine View; Provo Canyon; Salt Lake City. *Arizona*: Big Lake; Flagstaff; Grand Canyon; Greer; Kaibab National Forest; Vernon; White Mts.; Williams. *New Mexico*: Cloudcroft; La Jara; Magdalena; Pecos, 1 ♀ (type of *prominens*); Sandoval Co.; Santa Fe. *South Dakota*: Black Hills, 1 ♀ (type of *obscura*). *North Dakota*: North of Roosevelt National Park, McKenzie Co., 1. *Michigan*: Higgins Lake,

Roscommon Co., 4; Grayling, 1; Luzerne, 2.
Illinois: Chicago, 2.

Diplotaxis pacata Fall

UNITED STATES: *Nevada*: Las Vegas, 1. *Colorado*: Watkins, 1. *Arizona*: Gila River (type); Gila Bend, 7; Ehrenberg, 3; Hot Springs, 1; Salome, 26; Toltec, 8 miles south of Pinal, 2; Tucson, 2; White Mts., 1; Wellton, 1; Vicksburg, 2; Yuma, 1. *California*: Cathedral City, 2; Blythe, 48; Coachella, 3; Freda, 2; Hopkins Well, 5; Mecca, 1; Magnesia Canyon, Riverside Co., 1; Palm Desert, 16; Palm Springs, 5; Whitewater, 1.

MEXICO: *Sonora*: La Choya, 4; Desemboque, Aug., 22; Kino Bay, July, 1; Pitiquito, July, 1 ♂; San Luis, May, 1; Tastiota, July, 1 ♀; Rocky Point (Punta Peñasco), 9. *Baja California*: Mesquiteal, 1; San Felipe, 2.

Diplotaxis parallela Fall

UNITED STATES: *Arizona*: Chiricahua Mts., 47; Flagstaff, 1 ♂; Grand Canyon, 1 ♀; Heber, 1 ♂; Painted Canyon, Chiricahua Mts., 3; Paradise, Chiricahua Mts., 18; Pinal Mts., 1 ♀ (the type of *parkeri*); Pinedale, 1 ♂; Pinery Canyon, Chiricahua Mts., 35; Portal, 5; Prescott, 1 ♂; Sierra Ancha Mts., 3; Southwestern Research Station, Chiricahua Mts., 50; Yavapai Co., 1 ♂; Young, 1 ♀; Washington Mts., near Nogales, 1 ♂. *New Mexico*: Albuquerque, 1; Cedro Canyon, Bernalillo Co., 1; Dripping Spring, Organ Mts., 1 ♀ (the type of *parallela*); Jemez Springs, 5; Organ, 1; Sandia Mts., 2; Santa Fe, 3; Silver City, 3. *Texas*: 20 miles north of Hondo, Medina Co., July, 1 ♂ (see range of species in text).

Diplotaxis parvicollis Fall

UNITED STATES: *New Mexico*: Las Vegas, 2 ♂ (including type of *parvicollis*); Hot Springs, Las Vegas, 2 ♀; La Jara (Simpson's Ranch), 2 ♂; Luna, 3 ♂; Silver City, 5. *Arizona*: Apache Co., 1 ♂; Arcadia Camp, Graham Mts., 58; Carr Canyon, Huachuca Mts., 24; Chiricahua Mts., 1 ♀; Flagstaff, 3; Forestville, 1 ♂; Huachuca Mts., 1 ♂ (type of *acononicus*); Painted Canyon Ranch and Pinery Canyon, Chiricahua Mts., 1 ♂, 1 ♀; Pinedale, 8 ♂, 1 ♀; Portal, 2 ♂; Santa Rita Mts., 1 ♂; Southwestern Research Station, near Portal, 8; Wet Canyon, Graham Mts., 104; White Mts., 2 ♂; Yavapai Co., 1 ♂. *Colorado*: Durango, 1 ♂.

MEXICO: 1 ♂ (type of *labrata*). *Chihuahua*: Canyon Prieto near Primavera, July 2, 1947, 1 ♂, 1 ♀; 2 miles and 8 miles west of Matachic, July 7-8, 1947, 19; San Jose Babicora, July 5, 1947, 4; 10 miles west of Namiquipa, July 3, 1947, 1 ♀; 5 miles south of Terrero, July 30, 1950, 1 ♀.

Diplotaxis persisae Cazier

UNITED STATES: *Arizona*: Chiricahua Mts., Sept., 1935, 1949, 1 ♂, 2 ♀ (including the type); Painted Canyon Ranch, Chiricahua Mts., July, 1954, 1 ♂; Pinery Canyon, Chiricahua Mts., July, 1956, 1 ♂, Aug., 1949, 1 ♀; 5 miles west of Portal, 1 ♀; Southwestern Research Station, Chiricahua Mts., 1 ♀.

MEXICO: *Chihuahua*: San Jose Babicora, July 5, 1947, 4; Canyon Prieto, near Primavera, July 2, 1947, 1 ♂; 2 miles and 8 miles west of Matachic, July 7-8, 1947, 81; Kilometer 36, Santa Barbara to Ojito road, Aug. 17, 1947, 1 ♀.

Diplotaxis pinalica Fall

UNITED STATES: *Arizona*: Cochise Stronghold, Cochise Co., Apr., 2 ♀ (type and paratype of *microps*); White Mts., Apache Co., Sept., 1 ♂ (type of *recticanthus*), 11; Pinal Mts., Gila Co., Apr., 1 ♂ (type of *pinalica*), 4; Molina Basin, Santa Catalina Mts., Pima Co., July, 1 ♀; Yarnell, Weaver Mts., Yavapai Co., June, 1 ♂. *New Mexico*: Gila National Forest, northwest part of Grant Co., 1 ♂, 3 ♀.

Diplotaxis planidens Fall

UNITED STATES: *Arizona*: Baboquivari Mts. (Browns Canyon, El Mirador Ranch), 31; Ehrenberg, 1 ♀; Globe, 2 ♂; Goldfield, 4; Jerome, 1 ♂ (type); Lowell Ranger Station, Pima Co., 1 ♂; Madrona Canyon Ranger Station, Rincon Mts., 5; Oracle, Pinal Mts.; Organ Pipe National Monument, 1 ♂, 2 ♀; Phoenix, 2 ♀; Quitobato, 1 ♂; Sabino Canyon, Santa Catalina Mts., 17; Superior, 2 ♂; Tucson, 22; Wickenburg, 5.

MEXICO: *Sonora*: 10 miles west of Alamos, July, 1954, 20; La Cienaga, Aug., 1950, 1 ♂; Desemboque [on coast near Tiburon Is.], July, 1953, 1 ♂; Hermosillo, July, 1954, 1 ♀; 25 miles south of Llano, July, 1950, 2 ♂, 8 ♀; Santa Rosa Ranch, north of Navojoa, Aug., 1952, 13.

Diplotaxis pumila Fall

UNITED STATES: *Arizona*: Nogales, Aug., 6; Huachuca Mts., July, 4; Santa Rita Mts., Aug., 2 (including a paratype); Phoenix, 1; Sabino Canyon, July, 1 ♂; Baboquivari Mts., 1 (the type); Santa Catalina Mts., 2.

Diplotaxis punctata LeConte

UNITED STATES: *Nevada*: Reno, 1. *Utah*: Near Hanksville, base of Henry Mts., 1 ♀. *Kansas*: Kiowa Co., 1 ♀; Cove Co., 1; Salt Flats area, Stafford Co., 2 ♀; Dodge City, 1 ♂. *New Mexico*: Frontera, 1 (type of *punctata*); Carlsbad, 1; Floyd, 30; Roswell, 1 ♀; Tucumcari, 1 ♂. *Texas*: Alpine; Burkburnett; 20 miles west of Del Rio; Devil's

River, near Del Rio; Dimmit Co.; Edinburg; Frio State Park; Jeff Davis Co.; Karnes Co.; Laredo; Luling; Marathon; Marfa; McLennan Co., 1 ♂ (paratype of *fulgida*); New Braunfels; Palo Duro Canyon, Randall Co.; San Antonio; Sheffield; Smith Co., 1 ♂ (type of *fulgida*); Tyler; Uvalde; Val Verde Co. *Oklahoma*: Sayre, 1 ♀.

MEXICO: *Nuevo Leon*: Montemorelos, 3; Monterrey, 1. *Tamaulipas*: Xicotencatl, 1 ♀.

Diplotaxis punctatorugosa Blanchard

UNITED STATES: *Rhode Island*: Watch Hill. *New York*: Southold. *New Jersey*: Rancocas Park. *Delaware*: Seaford. *North Carolina*: Southern Pines, *South Carolina*: Type of *densicollis*; Beaufort; Florence; Meredith; Monsett; Ridgeland; White Pond. *Georgia*: Type of *excavata* and *frontalis*; St. Simon's Island; Stockton; Waycross. *Florida*: Alachua Co.; Ellaville; Gainesville; Hilliard; Jasper; Lakeland; Jefferson Co.; Leon Co.; Liberty Co.; New Smyrna; Wakulla Springs. *Alabama*: Barnesville; Mobile; Mt. Vernon; Seaclyff. *Mississippi*: Camp Shelby; Hattiesburg; Lucedale; Ocean Springs; Richton; Waynesboro. *Louisiana*: Bogalusa. *Arkansas*: Clark Co. *Texas*: Daingerfield State Park. *Oklahoma*: Cloudy.

Diplotaxis puncticeps Moser

UNITED STATES: *Texas*: Terlingua, Brewster Co., May, 1 ♀; Glenn Spring, Big Bend National Park, Brewster Co., May, June, 2 ♂; Sanderson, Terrell Co., June, 1 ♂. *New Mexico*: White City, Eddy Co., June, 1 ♀.

MEXICO: "Mexico," 1 ♂ (the type). *Durango*: Pedricena, Aug., 2 ♂, 6 ♀; 3 miles northwest of Pedricena, July, 23 ♀. *Coahuila*: La Gloria, south of Monclova, Aug., 11; Saltillo, July, 1 ♂. *Nuevo Leon*: 40 miles south of Saltillo [Coahuila], Sept., 3 ♀. *San Luis Potosi*: Rascon, Aug., 1 ♂; 46 miles north of San Luis Potosi, Sept., 1 ♀. *Puebla*: Tehuacan, Aug., 1 ♂.

Diplotaxis punctipennis LeConte

UNITED STATES: *Texas*: (See under the species in the text).

Diplotaxis punctulata Horn

MEXICO: *Baja California*: Big Canyon, Sierra Laguna, Oct., 1 ♀; Comondu, July, 6; El Taste, 2 ♂; Las Animas, Sierra Laguna, Oct., 1 ♀; Pescadero, Oct., 1 ♀; San Felipe, 4; San Jose del Cabo, 1 ♀ (syntype); Santa Rosa, 5; San Venancio, Oct., 1 ♂; Sierra El Taste, 1 ♀ (lectotype).

Diplotaxis residua Fall

UNITED STATES: *Idaho*: (See under the species in the text).

Diplotaxis roberti Vaurie

In addition to the type series from El Mogote, near Taxco, Guerrero, the following additional specimens have been examined:

MEXICO: *Guerrero*: El Mogote, near Taxco, June 1, 1954, 33; 8 miles north of Iguala, Aug., 1958, 1 ♂. *Morelos*: Alpuyeca, June, 1951, 3; 12 miles east of Cuernavaca, Aug., 1954, 1 ♀. *Michoacan*: Tuxpan, 1 ♂; near Morelia, July, 1947, 1 ♂; 12 miles south of Tzitzio (19° 20' N., 100° 50' W.), 1 ♀. *Jalisco*: Guadalajara, June, 1953, 1 ♂. *Oaxaca*: Tepetlapa, 1 ♀.

Diplotaxis rosae Vaurie and Cazier

MEXICO: *Chihuahua*: Buena Vista; Canyon Prieto, near Primavera; Catarinas; Gran Morelos; Huejotitlan and vicinity; Llano de Rio Santa Clara, near Parrita; Matachic and vicinity; Namiquipa and vicinity; Pedernales; Salas (the type and others); San Jose Babicora; Santa Barbara and vicinity. *Durango*: Encino.

Diplotaxis rotunda Vaurie

UNITED STATES: *Arizona*: (See under the species in the text).

Diplotaxis rufa Linell

UNITED STATES: *Florida*: 1 ♂; Georgiana, 3 ♂ (including the type); Gulfport, 2; Key Largo, 2; Port Sewall, Mar., 2; Rutledge, Apr., 1 ♀; Winter Park, Feb., Mar., 6.

Diplotaxis rufiola Fall

UNITED STATES: *Nevada*: Dixie National Forest. *Utah*: Bellevue; Washington Co. (paratype of *fulva*); Zion National Park. *New Mexico*: Cienega Ranch, near Rodeo; Deming; Cloudcroft; Jemez Springs; Las Cruces; Organ; Sacramento Mts.; Torrance Co.; White City; White Sands. *Nebraska*: Fort Robinson. *Arizona*: About 40 localities. *Texas*: Basin, Brewster Co.; Boquillas; Castolon; Dell City; Glenn Springs; Hot Springs; Jeff Davis Co.; Marathon; Memphis; Presidio; Van Horn; Valentine.

MEXICO: *Sonora*: Naco, 4; 29 miles north of El Oasis, 102; south of Llano. *Chihuahua*: Camargo and vicinity, 99; Canyon Prieto, 2; Chihuahua and vicinity, 14; 10 miles south of Delicias, 1; 30 miles south of Juarez, 1; Huejotitlan, 15; Ojo Laguna, 9; Ojo Lucero, 4; Primavera, 7; Santa Barbara, 51; Samalayuca, 21; Torreón, 14; Valle de Olivos, 16. *Coahuila*: Ojo de Agua, Sierra de Tlahualillo; San Pedro de Colonias, 2; Saltillo, 70. *Durango*: El Salto, 2; Pedricena and vicinity, 360; 35 miles southeast of Entronque, 11; Menores de Arriba, 1; San Juan del Rio, 83. *Guanajuato*: Guanajuato.

Diplotaxis saylori Cazier

UNITED STATES: *Arizona*: (See under the species in the text).

Diplotaxis schaefferi Fall

UNITED STATES: *Texas*: (See under the species in the text).

Diplotaxis semifoveata Fall

UNITED STATES: *Arizona*: Huachuca Mts.: 5 ♂, 5 ♀; Carr Canyon, 3 ♂, 1 ♀ (the type); Ramsey Canyon, 2 ♀; Sunnyside Canyon, 1 ♀. Chiricahua Mts.: 1 ♂; Southwestern Research Station, near Portal, 2 ♂; Portal, 1 ♀; South Fork, Cave Creek, 1 ♀. Santa Rita Mts.: 1 ♂; Madera Canyon, 2 ♀.

Diplotaxis sierrae Fall

UNITED STATES: *Nevada*: Ormsby Co. (cotype, not examined). *California*: Barton's Flats, San Bernardino Co.; Carrville, Trinity Co.; Cedar Grove, Kings River Canyon; Cedarville; Confidence, Tuolumne Co.; Crystal Lake, Los Angeles Co.; Coffee Creek, Trinity Co.; Crestline; Duns-muir; El Monte Oaks, San Diego Co.; Feather River, Butte Co.; Forest Hill, Placer Co.; Hat Creek and Helen Lake, Shasta Co.; Indio; Lake Arrowhead, San Bernardino Co.; Miami Ranger Station, Mariposa Co.; Milford; Pollock Pines; Quincy; Rogers Peak, Panamint Mts., Inyo Co.; San Bernardino Mts.; Santa Ana; San Jacinto Mts.; Snowline Camp, Eldorado Co.; Shaver Lake, Fresno Co.; Whitney Portal, Inyo Co.; Yosemite Valley.

Diplotaxis sonora Vaurie

In addition to the type series from Hermosillo, Sonora, the following specimens have been examined:

MEXICO: *Sonora*: Hermosillo, July 9 to 16, 1953 (B. Malkin), 75; Santa Rosa Ranch, near Navojoa, Aug. 2, 1952 (C. and P. Vaurie), 4; Navojoa, Aug. 7, 1956 (Vincent D. Roth), 2 ♂; Esperanza, July 15, 1955 (F. Pacheco), 4. *Sinaloa*: Eldorado [El Dorado], Aug. 4, 1943 (H. D. Smith), 10, Aug. 4, 1954 (F. Islas), 12.

Diplotaxis sparsa Vaurie

In addition to the type series from Acapulco, Guerrero, the following specimens have been examined:

MEXICO: *Sinaloa*: Mazatlan, July 22, 1954 (M. Cazier, W. Gertsch, the Bradts), 1 ♂; March 18, 1918 (J. A. Kutsche), 1 ♂. *Nayarit*: Maria Madre Island, Tres Marias Islands, May 14, 1925 (H. H. Keifer), 6 ♂, 4 ♀. *Colima*: "Vulcano" (L. Conrad), 1 ♀; Paso del Rio, 200 ft., Feb., 1953 (I. J. Cantrall), 1 ♂; Manzanillo, July, 1956 (R. and K. Dreisbach), 1. *Guerrero*: El Marques, 78 kilo-

meters east of Acapulco, July 18, 1957 (W. W. Gibson), 1 ♀.

Diplotaxis subangulata LeConte

CANADA: Basque; Kamloops; Penticton.

UNITED STATES: *Washington*: Yakima; Vantage. *Oregon*: Blitzen Valley; Arlington; Summer Lake; Harney Co.; Ione; The Dalles; Hermiston. *Idaho*: Pocatello; Atlanta; Shoshone. *Nevada*: Elko; Nye Co.; Pyramid; Panaca; Caliente. *Utah*: Snow Canyon; St. George; Moab; Cedar Mts. *New Mexico*: Albuquerque; Belen; Cienega Ranch near Rodeo; Deming; Cubero; Farmington; Hot Springs; Jemez Springs; Las Vegas; Las Cruces; Organ; Pyramid Peak. *Kansas*: 3. *Arizona*: About 60 localities throughout the state. *California*: About 30 localities. *Texas*: El Paso, 3; Marathon, 14; Odessa, 1; Van Horn, 2.

MEXICO: *Chihuahua*: Ahumada, 1 ♂; Ojo Lucero, Aug., 16; Samalayuca, June, Aug., 3 ♂. *Sonora*: Choya Bay, 1 ♀; Desemboque, Aug., 2 ♀; Laguna Prieta [not located], May, 1 ♀; Puerto Libertad, Aug., 1 ♂, 1 ♀; 25 miles south of Llano, July, 1 ♂; San Luis, May, 1 ♀; Pozo Coyote, July, 1 ♂; Miramar, Guaymas, July, 1 ♂; Rocky Point (Punta Peñasco), July, 5; Santa Rosa Ranch, Navojoa, Aug., 1 ♂, 3 ♀; Yavaros, July, 5. *Baja California*: Agua Caliente, Oct., 3; Cata- vina, July, 2 ♀; Bahia San Quintin, Sept., 1; El Refugio, July, 1 ♀; San Domingo, Oct., 1 ♀; San Fernando, July, 1 ♂; Santo Tomas, July, 1092.

Diplotaxis subcostata Blanchard

UNITED STATES: *New Jersey*: Browns Mills; Lakehurst; Rancocas Park; Spotswood; Weymouth. *North Carolina*: Southern Pines. *South Carolina*: Beaufort; Florence; Meredith; St. Paul; White Pond. *Georgia*: Billy's Island, Okefenokee Swamp; Newton; Valdosta; Ware Co. *Florida*: Alachua County; Arcadia; Bay Co.; Cedar Key; Charlotte Harbor; Chipola Lake; Coronado Beach; Edgewater; Gainesville; Holmes Co.; Jacksonville; Kissimmee; Liberty Co.; Madison Co.; Myrtle Beach; Suwanee River; Walton Co. *Alabama*: Baldwin; Grand Bay; Lock 14, Tuscaloosa Co.; Mobile; Mt. Vernon; Spring Hill. *Mississippi*: Lucedale; Ocean Springs.

Diplotaxis sulcatula Fall

UNITED STATES: *Texas*: Two; Fort Bliss, 1 ♀ (type); Castolon, 3; El Paso, 13; Fabens, 24; Presidio, 7; New Braunfels, 1; Big Bend National Park, Brewster Co., 30; Hot Springs, Big Bend National Park, 28. *New Mexico*: One; Mesquite, 1; Hot Springs, 2; Las Cruces, 3. *Arizona*: Three; Phoenix, 1.

MEXICO: *Chihuahua*: Delicias and vicinity, July, 1947, 63; 20 miles south of Juarez, July,

1952, 1 ♂. *Coahuila*: San Pedro de las Colonias, Aug., 1947, 1 ♀.

***Diplotaxis tenebrosa* Fall**

CANADA: *British Columbia*: Oliver, May, 6; Fairview, 3.

UNITED STATES: *Washington*: Ritzville, May, 1 ♀; Spokane, 3. *Oregon*: Burns, 1 ♂; Portland, Apr., 1. *Montana*: Helena, 7 ♂ (including type), 2 ♀. *Nevada*: Carlin, June, 1 ♂, 1 ♀. *California*: Five; Dorris, Siskiyou, July, 1 ♀. *Arizona*: 1 ♀.

***Diplotaxis texana* LeConte**

UNITED STATES: *Texas*: One ♂; Alpine, Brewster Co., May, Aug., 3 ♂, 3 ♀; Fort Davis, Jeff Davis Co., Sept., 2 ♂, July, 1 ♂; Helotes, Bexar Co., July, 1 ♀; Concan, Uvalde Co., July, 1 ♂; New Braunfels, Comal Co., June, 1 ♀; Burnet Co., 1 ♂; near Boerne, Kendall Co., July, 1 ♀; Kerrville, Kerr Co., June, 2 ♂, 4 ♀; Menard, Menard Co., June, 1 ♂.

***Diplotaxis thoracica* Fall**

UNITED STATES: *Kansas*: Gray Co., 1 ♀. *Oklahoma*: Tulsa, 1 ♀; Wichita National Forest, Comanche Co., June, 5. *New Mexico*: Roswell, 1 ♂, 2 ♀; White City, June, 1 ♂, 1 ♀; Tucumcari, July, 1 ♀; Artesia, 1 ♀. *Colorado*: Baca Co., May, 1 ♀; Regnier, Baca Co., June, 6. *Texas*: The following counties: Bexar, Brewster, Brooks, Cameron, Comal, Dimmit, Erath, Hidalgo, Jeff Davis, Kerr, Kleberg, Menard, Nacodoches, Sanderson, Terrell, Uvalde, Val Verde, and Webb.

MEXICO: *Nuevo Leon*: Vallecillo, June, 1951, 2 ♀; Monterrey, Mar., 1 ♀; Campo Apodaca, 19 kilometers north of Monterrey, Apr., May, 1 ♂, 3 ♀. *Tamaulipas*: 8 miles east of Padilla, Rancho Santa Ana, Dec., 1941, 1 ♂. *Chihuahua*: June, 1 ♀.

***Diplotaxis trapezifera* Bates**

MEXICO: *Durango*: Santa Maria del Oro, 1 ♂; Villa Lerdo, 1 ♀; Ventanas, 1 ♀; Nombre de Dios, 11. *Sinaloa*: San Ignacio, 1 ♂; Mazatlan, about 250; Venedio or Venodio, 35; Presidio, 1 ♂, 1 ♀. *Nayarit*: Acaponeta, 12; Tepic, 9; Tres Marias Islands, about 155. *Colima*: Vulcano, 4; Armeria, 6; Colima, 4; Manzanillo, 2. *Jalisco*: Guadalajara, 1 ♂; Ajijic, 12; Playa de Barrancas, 20. *Guerrero*: El Mogote near Taxco, 3; Chilpancingo, 1 ♀; Acaapulco, 2 ♀; Teloloapan, 5; Mexcala, 2 ♂. *Morelos*: Cuernavaca, 19; Alpuyec, 8; Amacuzac, 1 ♂. *San Luis Potosi*: Valles; Rio Verde, 1 ♂; Xilitla, 1 ♀. *Veracruz*: Jalapa, 4 (including the type); Tejeria, 1 ♂, 1 ♀. *Oaxaca*: Tehuantepec, 10; Salina Cruz, 4; 8 miles north of Niltpec, 4; Tepanistlahuaca, 1 ♂. *Chiapas*: Las Cruces; Ocosingo Valley, 7; 15 miles northeast of Los Amates, 1 ♀; Rancho Ocuilapa, southeast of Tonalá, 4; 3 miles south-

west of Tonalá, 2; Arriaga, 1. *Yucatan*: Temax, 1 ♀; Chichen Itza, 1 ♂; Piste, 7.

GUATEMALA: Zacapa, 20; Chiquimula, 3; 8 kilometers east of Jalapa, 1; 70 miles east of Guatemala City, 32; Guatemala City, 3.

EL SALVADOR: San Salvador, 12; El Rosario, Cuscatlan, 10.

HONDURAS: Olanchito, 2; Zamorano, 17.

NICARAGUA: Managua, 2 ♂; Esteli, 2 ♀; Chontales, 1 ♂.

COSTA RICA: Turialba, 5; Santa Elena, 1 ♀.

***Diplotaxis trementina* Fall**

UNITED STATES: *Texas*: Marathon, June, 1 ♂, 7 ♀; Alpine, July, 1 ♀; Davis Mts., July, 9; Chisos Mts., May, 1 ♀; Van Horn, July, 1 ♂. *New Mexico*: Aug., 1 ♂; Hope, July, 3 ♀; Trementina, 1 ♀ (type); Cubero, 1 ♀. *Arizona*: Nogales, 1 ♀.

***Diplotaxis tristis* Kirby**

CANADA: *Ontario*: Belleville, 3; Hamilton, 2; Islington, 3; Poverty Bay, Parry Sound, 1. *Nova Scotia*: 5; Bridgetown, 1.

UNITED STATES: *Maine*: One; Bar Harbor, 6; Medomak, 1. *New Hampshire*: 1; Franconia, 6. *Vermont*: Arlington 1; Bennington Co., 1. *Massachusetts*: Cambridge, 1; Forest Hills, 1; Lenox, 2; Melrose, 2; North Adams, 6. *Connecticut*: Cornwall, 1; Litchfield, 1. *New York*: Albany, 1; Bear Mt., 2; Fort Montgomery, 1; Hague, 1; Ithaca, 25; Mooers, 2; Saratoga, 1; Tuxedo, 2; West Point, 1. *New Jersey*: New Brunswick, 1. *Pennsylvania*: Delaware Water Gap, 2. *Ohio*: Clifton, 1; Put-in-Bay, 1. *Michigan*: 24 specimens from 12 localities. *Illinois*: Ottawa, 1; Catlin, 2. *Wisconsin*: One. *Minnesota*: St. Paul, 1.

***Diplotaxis truncatula* LeConte**

UNITED STATES: *Kansas*: Gove Co., 2; Sherman Co.; Scott Co. *Colorado*: Golden, 3; Boulder, 3. *Arizona*: Portal; Paradise Canyon; Chiricahua Mts. *New Mexico*: Carlsbad Caverns, 2; Grants, 1; Hope, 4; White City. *Texas*: Alpine; Basin, Big Bend National Park; Brownsville; Brownwood; Burnet Co.; Carrizo Springs; Castolon; Comstock; Christoval; Chisos Mts., Big Bend; Davis Mt. Jct.; Davis Mts.; Dimmit Co.; Donna; Edinburg; Fort Davis; Gillespie Co.; Hidalgo Co.; Jeff Davis Co.; Kerrville; Laredo; Marathon; Menard; New Braunfels; Ozona; Pine Springs; Port Isabel; Randall Co., Rio Grande City; San Juan; Sheffield; Sonora; Uvalde Co.; Val Verde Co.; Van Horn; Weslaco.

MEXICO: *Coahuila*: La Gloria, south of Monclova, 6; San Carlos, 2; 8 miles north, 25 miles west, of Quatro Cienegas, 30. *Durango*: El Tascate, 1 ♂, 1 ♀. *Chihuahua*: 10 miles north of

Jimenez, 1; Santa Barbara at Kilometer 36, 14. *Nuevo Leon*: Montemorelos, 2; Rancho Presa, 2; El Cercado, 17; Vallecillo, 3; Volcan de Santiago [south of Monterrey], 1; Galeana, 1; Campo Apodaca, northeast of Monterrey, 42. *Tamaulipas*: Abasolo, 3; Ciudad Victoria, 130; Hidalgo, 1 ♂; Padilla, 1; San Carlos Mts., 19; Villagran, 1; Xicotencatl, 2. *San Luis Potosi*: Valles, 14; Rascon, 1. *Hidalgo*: Zimapan, 2 ♂, 2 ♀.

***Diplotaxis unguolata* Cazier**

UNITED STATES: *Arizona, New Mexico, Texas*: (See under the species in the text.)

***Diplotaxis urbana* Vaurie**

UNITED STATES: *Illinois*: (See under the species in the text.)

***Diplotaxis yucateca* Vaurie**

In addition to the type series from Chichen Itza and Piste in Yucatan, Mexico (see text), the following specimens have been examined:

MEXICO: *Yucatan*: Uxmal, June 16-18, 1959 (P. and C. Vaurie), 335; Chichen Itza, June 30, 1951 (L. J. Stannard), 1 ♂. *Chiapas*: 10 miles west of Tuxtla Gutierrez, June 21, 1955 (R. B. and J. Selander), 1 ♂.

EL SALVADOR: *San Salvador*: San Salvador, May, June, 1958 (O. L. Cartwright), 1 ♂, 2 ♀. *La Union*: Volcan Conchagua, May, 1958 (O. L. Cartwright), 1 ♀.

HONDURAS: *Morazan*: Zamorano, July 11, 1948, "light" (T. H. Hubbell), 1 ♂.

COSTA RICA: *Puntarenas*: Dominical, May 28, 1942, 1 ♂.

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